Unpacking the opportunities for change within a family owned manufacturing SME: A design led innovation case study.

Erica Pozzey
B. Industrial Design

KK60 Masters of Design (Research)
Creative Industries, School of Design, 2013

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

10.10.13

Signature Date

Keywords

Design led innovation
Family-owned business
Manufacturing
SME’s
New product development
Strategy

Table of Contents

Abstract

The following thesis presents findings from an action research case study within a family owned manufacturing SME. The objective of the research was to understand how the case firm responded to the design led innovation approach as conducted by the researcher. Specifically, it investigated the barriers and opportunities that arose within the firm throughout the application of design led innovation. The study is critical to the Australian, family owned SME sector as they face unprecedented challenges to remain competitive within an increasingly accessible global marketplace. Forces from international offerings mean these firms need to find new ways to create value for the customer not just in new products and services, but also in business model innovation. Design led innovation is an approach that fosters innovation through the marrying of both organisational and strategic paradigms of the business. Its application helps businesses find new markets through designing and prototyping new business model scenarios and ensuring all facets of the business are aligned with the customer. The findings were extracted through three key data collection methods: a reflective journal, 25 qualitative, semi-structured interviews and a focus group session. Specific opportunities regarding how the firm could change to engage with a design led approach emerged through thematic analysis of the data. These findings included: the absolute importance of the family leader being visible and actively communicating the need for change and the value of design led innovation. Secondly, ensuring that the 'hard' assets, like products and services are aligned to the new vision. Thirdly, stimulating the cultural environments of those from the operational sides of the firm like design and engineering to drive new thinking and change. Lastly, the opportunity to leverage these people to spend more time during the early stages of new product development to ensure radical ideas are cultivated and driven through the new product development process by deep customer insights. The findings of this research are significant because they reveal key insights in to how family owned firms that operate under unique organisational structures could integrate design led initiatives. This is an important contribution to the existing body of knowledge because it provides the first evidence of how the design led innovation framework could be applied into a family owned SME.

Acknowledgements

Firstly, I would like to note my gratitude to those whom I worked closely with at the industry placement. The time and perspective you shared in helping me learn about your business as well as your support in providing the necessary resources for the research to be carried out is deeply appreciated. My time there would not have been the same without the people that keep the ball rolling and make the working atmosphere so enjoyable. Even though the research is over, the journey to becoming design led isn't! Some encouraging words from the Managing Director:

"I realise full well that our transition to a design led business is not easy nor will it happen quickly but we are committed and will not give up on the drive to achieve this outcome".

Secondly, I would like to extend my gratitude to my Associate and Principal Supervisors, Dr Cara Wrigley and Professor Sam Bucolo. Your knowledge and experience of design and industry embedded research was invaluable in assisting me to move forward when presented with unique challenges. Your confidence in me to overcome these obstacles as a designer has undoubtedly helped me to grow and learn immensely.

Finally, to my close friends and family that supported me through both the research and writing phases of the study. Without such a great circle of people to provide a welcome break, the outcome may have been very different.

Chapter 1: Introduction

1.1 Background

Worldwide, business innovation or business model innovation is gaining recognition as one of the most important contributors to growth in the global marketplace (Wrigley and Bucolo, 2012; Lockwood, 2010; Neumeier, 2008; Johnson, 2010). Many countries are investing in their enterprises to find new ways to create value for the customer, not only in new products and services but also, in entirely new business model propositions. Australian small to medium sized enterprises (SME's) are the largest business segment that fuel Australia's economy (Australian small business, 2011). As the market expectations shift, the demand for SME's to overcome organisational challenges to foster an innovative culture is becoming critical. Consequently, investigating SME's capacity to adapt to the rapidly changing marketplace and drive innovative activity is fundamental to the future economic prosperity of Australia.

However, the desire to foster an authentic culture of innovation and drive strong value propositions through a deep understanding of the customer is not an easy undertaking in any SME. The need for firms to stay cash flow positive in an increasingly competitive global market requires consistent re-evaluation of existing strategies as well as the creation of new visions and alternative scenarios (Lockwood, 2010; Matthews and Bucolo, 2011). The challenge being that for a firm to identify, eliminate or innovate aspects of the business that are not adding value to the customer requires a deep understanding of what it *actually* is the customer wants. Consequently the continuation of existing business activities often prevails through a preference to protect what has been established even when there is recognition of weaknesses in the business model proposition or execution of the proposition.

Design Led Innovation (or DLI) as further defined in chapter 4 helps organisations by using design thinking as a language and activity to bring into perspective every core facet of the business to align the business model proposition with customer needs and possible market futures. Programs that have shown design led innovation's success include Better by Design in New Zealand and the United Kingdom's Designing Demand (UK Design Council, 2008; Better By Design, 2012). The outcomes of these programs have demonstrated design led innovation as a valid approach in better engaging with customers and sustaining a competitive difference within the market. "Design led innovation helps you get closer to the market and identify latent market needs but more importantly transform this into strategy, which drives products and services" (Bucolo, 2012).

Yet there is still much to be learnt about how firms internalise and integrate the design led approach and instil a culture of innovation (Matthews and Bucolo, 2011; Bolton, 2009). More specifically there is no research available that examines the opportunity for *family owned* SME's to integrate design led innovation. Therefore, this research adds to the field of design led innovation by developing a better understanding of family owned SME's and their ability to develop change capacity and integrate a design led approach. Family owned businesses have unique characteristics that affect their capacity to change. These characteristics have been extensively discussed in literature under topical areas such as stewardship, leadership, culture and knowledge dissemination.

This thesis presents findings from an action research study into one family owned firm who manufacture goods to the Australian industrial sector. The research, conducted over the period of one year, was carried out through the researcher taking on an embedded, 'design catalyst' role within the firm. Within this thesis, the term design catalyst is used in reference to the researcher and their role in facilitating discussion and activity to bring about

design led change. As a design catalyst utilising an action research approach, the researcher's role was to try and effect change through the integration of design led innovation.

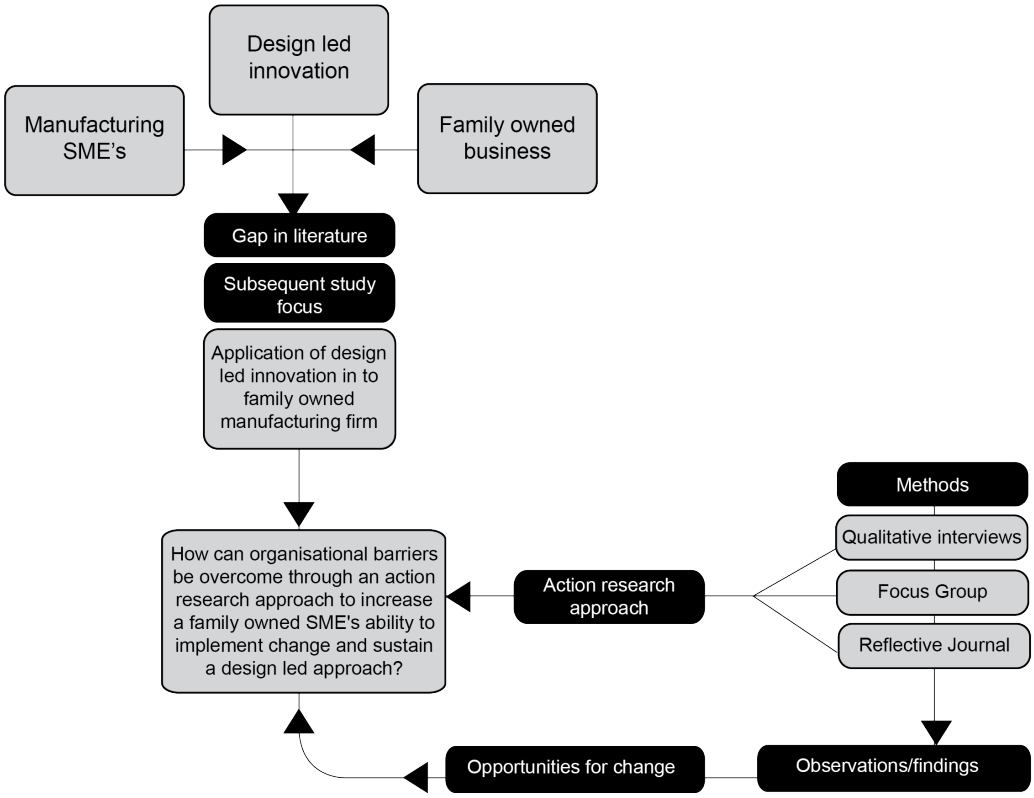


Figure 1 – Research design and approach

Figure 1 above illustrates the research design and approach. Three key sets of data were collected including a reflective journal, qualitative interviews and a focus group. The data revealed key observations that demonstrated the firm's capacity to engage in a design led approach. These will be explored further in the Chapter 8, which presents the findings of the investigation.

1.2 Research Problem

The problem this research addresses is the lack of knowledge concerning the internal barriers and conflicts design catalysts or mentors may face when trying to shift an organisation's established processes and culture towards design led innovation. Ultimately this requires an intimate understanding of how to effectively articulate and internalise design led value within business

discourse. This is critical in generating 'buy-in' with key firm stakeholders who are leading proponents of the cultural, operational and strategic goals of the organisation.

Consequently, an action research approach is required to gain an intimate understanding of the organisational barriers within a family owned firm that are likely to inhibit design led change. These barriers are fundamentally important to understand so family owned SME's and DLI catalysts could manage the integration of design led innovation more effectively in the future. As a critical contributor to Australia's economic health, these firms need to become better equipped to manage rapid change and market disruption so they can remain competitive on the global stage.

Taking on an embedded action research approach, this investigation documents the application of design led innovation from an internal perspective. This is a great contribution to the current body of knowledge because becoming design led fundamentally relies on the firm's ability to truly shift their thinking in a radical way. As a design catalyst, embedded within the firm, the researcher is able to tap into the important role culture plays in driving innovation, not just with design but also through all aspects of the business. Explained by Lockwood (2010) as, "… moving beyond design management to design leadership as a design– minded organisation".

1.3 Purpose/Objectives of the study

This research considers design led innovation as a valid approach as evidenced by its success around the world (UK Design Council, 2008; Better By Design, 2012, Wrigley and Bucolo, 2012). In light of this, the aim of this study is not to further validate its merit but to unpack its application into a family owned SME. Furthermore, to identify the key opportunities for family owned SME's to integrate and capitalise on design led innovation.

The objectives of this embedded research is:

- To understand the key challenges and barriers of practical application of design led innovation within a family owned SME.
- To identify the subsequent opportunities for change to enable integration of design led innovation into a family owned SME.

Therefore the hypothesis developed is:
The ability for a family owned SME to sustain and implement design led innovation ultimately depends on the embedded core culture being able to internalise and adapt to the shift in thinking.

From this hypothesis, a research question and sub-question have been developed to guide the objectives. The research question is:

- *How can organisational barriers be overcome through an action research approach to increase a family owned SME's ability to implement change and sustain a design led approach?*

Sub – question:

- *Could family firms, where decision makers are often long-term proponents of the dominant culture, benefit in nurturing innovation from a bottom up approach rather than a top down approach?*

1.4 Significance of the Study

First and foremost, this research contributes to the existing body of knowledge in design led innovation and family owned business through developing a stronger understanding of how business and design fields better integrate in the workplace. Currently there is limited research specifically investigating the application of design led innovation into family owned SME's. Therefore, there is limited understanding of how these types of firms whom operate under unique organisational structures can integrate design initiatives.

Secondly, a global focus on innovation investment means businesses are in turn providing new opportunities for designers to build a desired and professional presence in the corporate sector (Pecas and Henriques, 2006). For designers and advocators of design led innovation, the challenge therefore resides in being able to convincingly articulate the benefits of design led innovation as a process with measurable outcomes, that are perceived as relevant to a business leader.

This research helps to identify the key strategies a design catalyst used in a family owned firm that helped towards integrating design led innovation. For designers, it is crucial to understand the drivers of organisational change and cultural learning in family owned SMEs - as well as the barriers (Cowan-sahadath, 2010). Once these obstacles are understood more intimately, design led innovation programs can deliver more effectively. Ultimately leading to numerous innovative benefits “not just in new products or services, but through employing, and skilfully managing and soundly implementing design throughout a company’s business strategy.” (Matthews and Bucolo, 2011, p. 667).

1.5 Thesis Structure

The following thesis is broken up into nine chapters - chapters 2 to 5 outline existing literature addressing family owned business, Australian manufacturing SME’s and the theoretical framework of design led innovation. Chapters 6 and 7 provide a description of the case study firm as well as how the methodology was structured in reflection of the existing literature. Finally, chapters 8 to 10 detail the results and discussion, the implications of the research and concluding comments.

In chapter 2, key subject areas within family business are presented regarding their impact on family owned organisations being able to effect change and remain competitive. These include the role of stewardship and

employee's emotional union with the existing cultures and business models. It also discusses the importance of leadership in initiating change and guiding the vision of the firm. Lastly, it explores how family owned firms grow into new markets and identify new competitive opportunities. It is recognised that literature on family owned SMEs is broad and far-reaching, including topical areas like organisational structures, culture, strategy; education, training and knowledge management. However, the scope of the review presented here aims to provide breadth rather than depth when evaluating existing literature.

Chapter 3 explores new product development within manufacturing firms. The case firm, which is family owned, manufactures product for the industrial sector of Australia. The literature focuses on the activity of new product development because of its pivotal role to design led innovation. Furthermore, this process is important to discuss in a manufacturing context to understand how design and engineering operate in conjunction with one another but also how new ideas are managed and researched. In summation, this chapter discusses the different skill sets of design and engineering but also how they integrate in the workplace, the tendency for manufacturing firms to utilise third party consultancies in new product development, the Stage Gate model of new product development and lastly, Australia's focus on innovation.

Chapter 4 discusses the theoretical body of information surrounding design led innovation and peer design models. This includes the difference between incremental and radical innovation, the value of design thinking and it's relationship to business. Also, the chapter discusses foundation models such as design driven innovation. Finally, the framework of design led innovation is discussed in detail.

Chapter 5 introduces the case study firm including its historical foundations, family structure, market involvement, value chain position and it's current perceptions of innovation. Background on how the firm approaches

innovation and where it focuses core activities will also be presented. These will contextualise the design catalyst's approach to the research on a product, process and meaning level.

Chapter 6 will document the research design of the study. Three key data collection methods are documented which include a reflective journal, qualitative interviews and a focus group. The participants and analysis methods will also be discussed. Following this, justification of action research as a valid approach will be presented including the strengths and weaknesses of utilising such an approach. The research objectives will again be re-iterated, followed by ethical considerations.

Chapter 7 presents the findings of the research, which are separated into core observations. These are presented as observations that affected the firm's ability to integrate design led innovation. These included the natural tendency for people at the firm to take on a very individualistic approach to work and new projects, which inhibits new thinking and idea exploration. Secondly, it was found that the skills and perspective of employees in operational segments of the business were under-capitalised and could be leveraged to inspire innovation and change. Thirdly, it was found that tacit barriers existed between the customer and the firm which both limited their ability to talk beyond product orientated factors and build strong relationships. Finally, it was observed that a clear and strong vision for the future delivered by leadership lacked dissemination throughout the firm, which impeded employee's conviction and decision-making in day-to-day activities.

Chapter 8 presents the subsequent opportunities stemming from these observations. Furthermore, how they are aligned with existing literature. These opportunities are framed as 'stepping stones' – by acting upon one identified observation; the next becomes accessible and able to be addressed.

Chapter 9 documents the implications of the research to the case firm itself, to the theory of design led innovation and to researcher. In this chapter, a final reflection on the engagement as a whole is also presented outlining the critical events that framed the researcher's involvement with the organisation.

Chapter 10 offers a concluding summary and some recommendations for future research.

This chapter has provided an introduction to the thesis topic as well as the purpose of the research including the objectives, significance and research questions. The following chapter reviews literature surrounding Australian family owned SME's. Following that, literature on new product development in manufacturing firms and design led innovation will be explored.

Chapter 2: Australian family-owned SME's

2.1 Introduction

Central to this research is family owned business and their capacity to integrate design led innovation. As the research question suggests, the cultural characteristics of a family owned business are a key factor to consider in the application of a design led approach. This chapter helps to better contextualise the research by reviewing literature on some key areas of family owned business. These include the long-term perspective that comes through family stewardship but also the need to balance financial frugality with investment opportunity. Leadership is also discussed in regards to the creation of strong cultural identities and mutual objectives of family members (Family Business Australia 2011).

It is important to note that this thesis discusses only a small selection of topics within family owned business and it is of choice to provide the reader with a breadth of literature rather than depth of literature. The focus points were selected as key characteristics that impact on behavioural and operational performance towards innovation (Hall, Melin and Nordqvist, 2001; Sharma, Chrisman and Chua, 1997; Harris, Martinez and Ward, 1994; Mintzberg and Waters, 1990).

Within Australia, SME's make a significant contribution to the economy, accounting for almost half of industry employment and contributing over a third of industry value added in 2009-10 (Key statistics, Australian small business, 2011). Taking a look at the productivity of the export sector in relation to Australian SME's shows the opportunity to leverage Australia's innovation and export capacity in the long-term. For example, research shows that 237 large mining companies (which make up around 1% of all Australian businesses) generate around 48% of Australia's total value of

export goods. Comparatively, SME's make up 86% of all Australian goods exporting businesses yet only generate 5% of the total goods export value (Roos, 2012). Though specific to mining, this illustrates the opportunity for this percentage of SME's (across a vast range of industries) to expedite growth and maximise their export capacity in order to keep Australia competitive within the global economy. For SME's to strengthen as a valuable resource in driving economic growth in Australia, a deep understanding of the factors that may impede the path to innovation is necessary.

2.2 Family stewardship towards innovation and growth

The Institute of Family Business (2011) defines 'stewardship' as: '*The active and responsible management of entrusted resources now and in the longer term, so as to hand them on in better condition'*. Other resources (Miller, Le Breton-Miller and Lester, 2009) however, take a more emotive stance suggesting stewardship as 'human caring, generosity, loyalty and responsible devotion within an institution'.

Considering this, there are some conflicting arguments over whether a strong culture of stewardship within family owned business is advantageous or harmful to the incubation of innovation (Hall et al., 2001; Denison, Leif and Ward, 2004). Family ties within business produce a high level of emotional commitment to protect the financial stability and therefore wellbeing of successive stakeholders (Institute of Family Business, 2011; Miller et al. 2001; Hall et al. 2001; Sharma et al. 1997). This has been shown to have a positive impact on the firm's ability to strategise for the long term, harness brand values and accumulate a high level of industry wisdom and skill. Alternatively however, as the business grows and becomes more stable, successive generations are more likely to maintain the core business strategy and professionalise how the business is run, than pursue a risky or entrepreneurial agenda (Family Business Australia, 2011; Denison et al.

2004). Ultimately leading to the business model becoming out of sync with customer expectations or changing market environments.

A good indicator of this behaviour is within a study conducted by Family Business Australia in 2011, which followed the experiences of 658 family enterprises from across Australia. Here they found that while most of the respondents believed in the need to innovate, a much lower number were actually setting aside funds for research and development and other activities to pursue innovation in their business. Family stewardship is a critical consideration to this research as it fundamentally affects the manner in which family owned firms approach financial, cultural and strategic decision-making and therefore their ability to drive innovation.

To help disseminate the key factors of stewardship in family business, a model used by the Institute of Family Business in the United Kingdom (and elsewhere) in 2011 can be employed. The study examined a number of family owned enterprises across generations and the key variables of family stewardship that were demonstrated to different degrees. These variables of stewardship are important as they determine key decisions when creating a strategy and agenda for growth. Four key variables in the 2011 investigation were used to measure stewardship; they included: family capital, people capital, financial capital and social capital.

- Family capital: examines the attachment between the business and the owners beyond financial ties. Rather it identifies the family as fundamental players in transmitting vision and values across generations.
- People capital: looks at non-family members of the business and how much their affiliation with the family transcends into their knowledge, skills, behaviours, energy and loyalty.

- Financial capital: identifies the financial prudence or responsibility for future generations when examining investment timeframes and measures of success.
- Social capital: looks at key stakeholders (internal and external of the business) and the trust or reciprocity of the relationships endured over an extended period of time (Institute of Family Business, 2011).

The salience of a particular variable in a firm can affect the outcome of decisions. For example, a family owned firm might fail to invest enough financial capital towards training and education of staff because it may be seen as not directly affecting the bottom line. Consequently, the 'people capital' of a family owned business could be disenfranchised and experience lessened sense of affiliation with the family culture. Yet, according to some authorities, consistent stabilisation of all capital variables over a long period of time risks homogenization of opinion and priorities, which makes nurturing new ideas and challenging the status quo very difficult (Miller et al. 2009; Family Business Australia, 2011; Denison et al. 2004).

The challenge however is having the ability to shift the business model (of which family, people, financial and social capital are the foundations of) when that growth factor subsides. Authorities identify that because the foundations like those described here are so emotionally embedded in the culture of the firm and have endured successive generations of business for both family and non-family members, there can be reluctance by family members to strategically alter the balance of capital for concern it may negatively alter the established environment (Institute of Family Business, 2011; Harris et al. 1994).

In summary, family owned firms have unique advantages as well as weaknesses that affect their ability to innovate. Stewardship is an important element that can certainly give family owned firms a strategic edge over non-family businesses through emotional investment in maintaining

organisational stability in the long-term. For the same reason however, stewardship can inhibit family owned firms in keeping up with competitors who have more flexibility to respond rapidly to emerging market opportunities (Oxtoby, 2002). Using an action research methodology, this investigation expands on existing knowledge by investigating the salience of stewardship and its role in enhancing or limiting a design led approach.

2.3 Socio-cultural character of family owned firms

Culture is defined as an 'interpretative framework through which individuals make sense of their own behaviour.' (Scott and Lane, 2000). There is some discretion over what culture constitutes within a family business; this thesis takes the stance that culture is an embedded, holistic set of values within the firm. From this perspective, a business does not *have* a culture but *is* a culture and so cannot solely be influenced by provisional cultural change tools (Hall et al., 2001).

Family business research suggests the founding family or leader have a large role in cultivating the shared values, goals and beliefs of the firm. In a longitudinal study Hall et al (2001) explored the cultural patterns influencing entrepreneurial or innovative change within two family owned firms. The study found that innovative change in firms was highly dependent on the redistribution of power relations. This is supported by the idea that long-term employees within the firm who predominantly hold managerial roles may show less receptiveness to change because "the feelings and emotions related to change are likely to be deeper and more intense than those in nonfamily businesses" (Hall et al., 2001). Regardless of this, "they are intimately involved in determining what kinds of change will be accepted and which refused, whatever their 'objective' desirability" (Schoenenberger, 1997). Therefore balancing family owned firm's preference for internal succession whilst still striving for innovation is challenging. This is highly relevant to the study at hand as it highlights the gap in understanding how innovation is best

nurtured within a family owned firm. Particularly when decision makers are often long-term proponents of the dominant culture but also perceived as the key influencers and orchestrators of change.

2.3.1 Diffusion of knowledge and learning

Diffusion of knowledge and learning refers to the spread and distribution of knowledge throughout an organisation. But also the degree to which new knowledge is absorbed. It is recognised that there are a number of strains to organisational learning literature (absorptive capacity; adaptive systems; single loop and double loop learning etc), and that this only serves as an overview.

A key area that is unanimously discussed regarding the successful diffusion of knowledge and learning is the channels through which important information is identified. Scholars recognise the fundamental importance of the channels and communicative culture of a firm in knowledge dissemination (Smith, 2008; Verganti, 2008; Cohen and Levinthal, 1990; Laforet and Tann, 2006). According to Oxtoby et al. (2002), the dissemination of knowledge within a firm requires ‘capturing the learning process’ where employees have transparency of information, thus yielding a faster learning response and sustained culture through empowerment.

Becoming proficient at this requires the business to have a high level of absorptive capacity which Verganti (2008) describes as: “the ability to understand and value external knowledge and therefore to make sense of it, to learn about it, and to adopt new approaches regarding it.” A low absorptive capacity can be detrimental in the development of an innovative culture as processes are built upon existing knowledge and the language of the firm becomes 'local' in nature; lacking consistency of meaning and shared vision (Roy and Gupta, 2007). Absorptive capacity within family owned firms is particularly important to cultivate as key sources of knowledge are often

funnelled through long term, existing employees whom are part of the entrenched culture. The learning capacity of the case firm is important to consider when answering the research question of this thesis, as the degree to which the design led approach is integrated will be dependant on the firm's capacity and willingness to learn.

2.4 Managing growth and recognising opportunity

All firms, family owned or non-family owned are often presented with the challenge of scaling their business to meet growing demand while maintaining focus on delivering value to the customer. There are numerous strategies discussed in the literature, assisting firms by increasing capacity like resources, training, production and risk management (McCann et al. 2001; Westhead and Howorth, 2006). In this study however, particular focus is on how family owned firms recognise opportunity for growth and then simultaneously explore those opportunities while exploiting existing firm activities. A key consideration of the research is how to achieve a balance between the existing core business activities that provide financial stability with new (design led) activities that actively try to risk that stability.

Family Business Australia (2011, p. 19) describe the challenge family businesses face in trying to innovate:

> "*… they (family businesses) need to find ways to create new streams of value within an existing long- term oriented organisational setting, through exploration of new ways of doing things and at the same time through exploitation of existing products, service or organisational processes."*

This means that existing organisational strengths and weaknesses should not be ignored but actively incorporated into the discussion to formulate innovation strategies. Furthermore that in order to sustain growth and competitiveness, firms need to synthesise both the incumbent, dominant

activities with those that prioritise finding new ways to deliver value to the customer, internalising and transferring new insights into tangible output (Lawson and Samson, 2001). Paradoxically, despite management often recognising the need to invest in exploiting new opportunities, processes are still continually developed "programming" mainstream business units to perform routines, formalise structures and not to think outside the square (Starbuck, 1983).

A number of proposed models highlight strategies that help organisations to concurrently explore and exploit opportunities, also referred to as a dynamic capability approach. Lawson and Samson, (2001) suggest that a firm's innovation capability is determined by their ability to simultaneously manage and provide resources to newstream innovation from the mainstream activities of the organisation. As shown in Figure 2, the resource and capability used to drive existing products, processes and systems (which over time is likely to erode through market maturity), should in turn be channelled into newstream innovation or business opportunities.

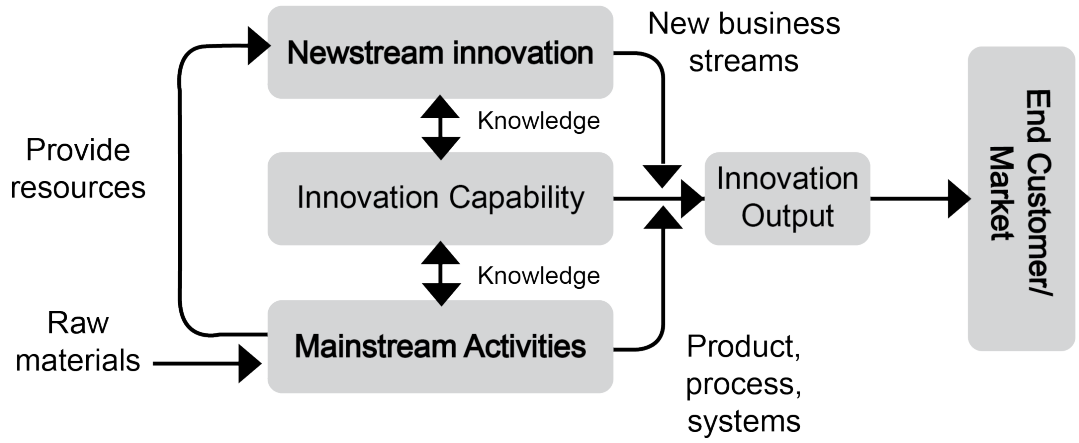


Figure 2 - Adapted from Lawson and Samson's (2001) integrated model of innovation

For an organisation to take on a dynamic capabilities approach however requires commitment to forgo profit in the short-term for the sake of ensuring

profit for the long-term. In other words, future-proofing' the organisation. Just as this requires a holistic, 'bigger-picture' perspective, the same can be applied to the scope of innovation possibility. Research suggests that family-owned firms need to look beyond the product and service based offerings that have historically sustained the business to continually drive competitive advantage in the marketplace (Bucolo and Wrigley, 2013; Chesbrough, 2007; Bucolo and Matthews, 2010; Battistella, 2012).

The Doblin Institute developed 'The 10 types of innovation' following research into hundreds of organisations (Doblin, 2011). The longitudinal research showed that while the majority of firms focussed investment for innovation on products, products actually provided the lowest return on investment and the least competitive advantage. Whereas investment in areas such as networks (how the company connects with others to create value), the profit model (how the company makes its money) and in the structure (alignment between company talents and assets) produced a much greater return on investment and competitive advantage (Doblin, 2011).

Once again however, tackling these kinds of areas within a family owned business could be confronting. Altering factors that contribute directly to the foundations of the business model can challenge members emotionally by risking financial stability, stewardship continuity, resource loyalty and core family values which are wrapped in history (Family Business Australia, 2011; Zahra et al. 2008). This is important to the research question at hand as it demonstrates the conflicting position family owned firm's face in exploring design led innovation while managing the existing, financially supportive activities.

2.4.1 Customer relationships

Literature discusses that one of the most imperative steps for an organisation striving towards innovation is to create an awareness of customers — both

internal and external. Creating an environment where employees are actively encouraged to search out customer needs and problems, both known and latent, in order to solve them in a value-adding manner (Bucolo and Wrigley, 2012; Moller, 2006).

According to literature, a strong family culture often means family firms have an advantage because they understand the value of building relationships with key stakeholders internal and external of the business (Family business Australia, 2011; Institute of Family Business, 2011). This is said to naturally provide family firms with an environment that tacitly harnesses empathy over their non-family firm competitors. This is extremely advantageous because organisations are increasingly recognising the need to move beyond a dominant product focus where the buyer is not passive but active and the process is no longer transactional but relationship specific (Homburg and Rudolph, 2001).

2.5 Summary

This chapter addressed literature on family owned firm's unique organisational characteristics, which frames the context of this research. Specific characteristics that make embarking on innovation initiatives challenging for family owned firms have been described in this chapter and are summarised into key points in the table below:

Literature	Challenge to innovation	Source
Family members and long-term employees of family owned firms typically show strong emotional ties to the existing business model, processes and culture. Furthermore, these are the key stakeholders who hold influential power towards change.	This creates a very embedded culture that becomes difficult to permeate with change initiatives. Particular attention needs to be given to creating 'buy-in' with key stakeholders.	Family Business Australia, 2011; Zahra et al. 2008; Harris et al. 1994; Denison et al. 2004; Sharma et al. 1997
Power is often centralised at the top.	Change initiatives rely on the leader to instigate and disseminate the vision across	Miller et al. 2009; Family Business Australia, 2011; Hall

	all levels of the organisation.	et al., 2001; Institute of Family Business, 2011
Over time, less risk is taken with the business model. Instead focus becomes about streamlining and finetuning organisational activities.	Financial frugality can deter family owned firms from embarking on new innovation initiatives that may compromise organisational stability for future generations.	Serrasqueirro et al. 2012; Hall et al. 2001; Westhead and Howorth, 2006; Family Business Australia, 2011

To finish, a brief summary of key points from the literature are described below. Family stewardship was discussed with mixed theoretical positions regarding stewardship's role in facilitating or limiting entrepreneurial change. Following on, literature on knowledge processing and learning was explored. It is widely accepted that the strong emotional bond with the incumbent foundations (ie business model, processes, culture) of the firm is favoured by long-term employees and can inhibit the firm's propensity for change. Alternatively, it is also seen to strengthen the firm through a higher degree of accumulated knowledge and industry expertise. Finally, research into how firms explore new opportunity whilst exploiting current activities highlighted the importance of finding ways to capture and meaningfully interpret external information.

Stewardship's impact on a design led approach however, remains largely unexplored. Gaps in the knowledge base include the impact of family orientated goals on the firm's ability to engage with design led innovation as a process, culture and strategy. In addition, it is unclear how family owned firms transcend the existing culture to generate 'buy in' for new change initiatives, such as design led innovation. Furthermore, how a design catalyst approaches long-term family and non-family employees who are predisposed to favour models of the past but whom also play a fundamental role authorising and endorsing new ways of thinking.

Chapter 3: New product development in manufacturing firms

3.1 Introduction

The following chapter reviews literature on new product development in manufacturing environments. As this research is based on a family owned firm whose core business exists in manufacturing, it is important to understand the context in which a design led approach is being applied. Furthermore, as a pivotal lever for change in design led innovation, new product development needs to be understood in the context of manufacturing. This includes the balance and prioritisation between design and engineering skills and the process of idea development and conceptualisation. As an activity that typically resides in the operational segments of a manufacturing firm (as opposed to the strategic segments), this raises the question of how best to integrate design led innovation on both an operational level for execution and strategic level for vision creation.

In this chapter, focus is first on the integration of design and engineering in a manufacturing environment as two opposing yet complimentary skill sets. Secondly, literature on the effect of contracting third party design consultancies to develop new products and services is discussed. Finally, an overview of the core principals of new product development is presented, including the Stage Gate model.

3.2 Historical influences

Historically, the Industrial Age saw the beginnings of commodity-based manufacturing. It created an insatiable demand for the continually engineered solution that created cost savings and higher turnover through the expedition of goods moving through production (Neumeier, 2008). While

society now recognises both as valid disciplines with varying philosophies, it is widely accepted that engineering was more formally recognised earlier than design. The rise of design was most likely around the early 20th century when the majority recognised German Bauhaus as a commercially viable creative activity. Here, 'the designer's mission was a matter of infusing industrial artefacts with the sensibilities of Modernist art' (Neumeier, 2009). Even so, design was still largely regarded as a function of 'styling' where performance was not attributed to the design involvement but most likely to the engineered input.

A broader explanation of design was put forth by social scientist and Nobel Laureate Herbert Simon who viewed a designer as 'everyone …who devises courses of action aimed at changing existing situations into preferred ones' (Neumeier, 2009 p. 32). Martin (2007, p.56) extends design as critical to strategic orientation through its capacity to 'solve problems and create effective change inside an enterprise and its vision through generative reasoning tools such as prototyping and iteration.' Considering this and engineering and design skills, it is clear that both are fundamental capabilities in bringing about change in the current business environment.

In a business sense many firms have, over time, experienced the shift between what Neumeier (2009) describes as 'spreadsheet thinking', where metric based predictions on market potential and the execution of delivery, dominated how businesses made crucial decisions and determined success. Drawing some similarities to how engineering would be seen to approach problems (by providing logic through numbers, forces, strength, tolerances for example). Yet firms are now being challenged to understand their customer in entirely new ways beyond data analysis and measurable performance agendas. The market demands a much stronger emotional and personable understanding of the customer where value is expected in every intangible as well as the tangible touch-points of a business (Martin, 2009; Teece, 2010, Bucolo and Wrigley, 2012).

The integration of design and engineering in manufacturing will be fundamental to creating radical innovation through a design led approach. In the manufacturing context, engineering, as a primary resource in the development of new product is critical in being able to provide technical rigor. However, as the demands of the market are shifting to be more relationship orientated and customers are seeking value beyond product-centric offerings, the need to integrate design in the early stages of idea conceptualisation is critical. This is because designers are able to fill the gap between customer and product, navigating the typically ambiguous and uncertain stages of capturing customer insights and transforming those into value propositions (Lockwood, 2009).

Supporting this is a study, which focussed on the need to incorporate design, thinking into the engineering teaching curriculum; the following key design skills were seen as critical to the future capabilities of the engineer (Dym et al., 2005):

- Tolerate ambiguity that shows up in viewing design as inquiry or as an iterative loop of divergent-convergent thinking;
- Maintain sight of the big picture by including systems thinking and systems design;
- Handle uncertainty;
- Make decisions;
- Think as part of a team in social process; and
- Think and communicate in multiple languages/mediums to understand multiple audiences.

These kinds of skills are important for the design catalyst to cultivate and promote within the case firm as part of a design led approach. As the firm has a dominant engineering focus, this may challenge the existing culture and processes particularly in the early phases of new product development.

For example, placing more emphasis on understanding the customer and the broader variables that operate on the peripheral of the customer may be adverse to previous approaches. This further emphasises the need to align both the design and engineering objectives in a manufacturing firm to create an environment conducive to design led innovation.

3.3 Aligning design and engineering objectives in manufacturing strategy

As industrial manufacturers, engineering is a key resource to the case firm as it is vital in maintaining production quality and structural rigor. Design however, holds a secondary function, which means that achieving design integration requires strategies that exploit both the engineering and design functions harmoniously. In this chapter, focus is on the factors that may impede their integration in business but also how manufacturing firms may typically contract or outsource creative design work.

Engineering is central in a firm's plan for the costs of production, materials and/or components as well as converting those inputs into finished goods. The engineering resource is critical in ensuring positive return on investment (Marion and Meyer, 2011). As a family owned firm, which can often be financially frugal, the management of engineering activities may take precedence over design's role in new product development. Design, as a function critical to understanding the needs, preferences, and environments of target users can be regarded as a time consuming and challenging activity to continuously manage.

This is perhaps because historically engineering has been seen as a very structured, measurable and specification-driven approach to new product development (Neumeier, 2008; Dym et al. 2005) while design is perceived as a creative, iterative and customer driven method (Lockwood, 2010; Neumeier, 2008). Naturally, the manufacturing environment is conducive to an

engineering mentality and could find it challenging to develop greater capability in design and design thinking approaches. Some literature (Amabile, 1996) suggests this may be because design is often perceived as a purely creative activity that is only manifested in tangible offerings or novel features on product for example. What some fail to identify is the value of creativity in the means of delivering the product; the identification of new market opportunities, or the organisation and systems that bring the product to market.

Recent research into manufacturing strategy however highlights that balancing design creativity and process discipline is integral to success and innovation (Marion and Meyer, 2011; Berends et al., 2010). Furthermore, the equal integration and prioritisation of both capabilities within a family owned manufacturing SME is fundamental in achieving effective design led innovation (Wrigley and Bucolo, 2012). However, as the next section demonstrates, many manufacturing firms choose to outsource strategic design work, which makes the integration of both skills difficult to cultivate.

3.4 Use of external design consultancies

Strategically integrated design activities within the broader SME sector are quite limited. This means that design is of minimal consideration as a strategic skill or asset. Many barriers to engagement have been identified within SME literature including: too many pressures on other parts of the business, limited resources which results in a lack of focus on issues requiring time and cost and lack of a practical strategy to guide implementation (Hovanessian, 2008, Laforet and Tann, 2006). This is supported by some studies (Family Business Australia, 2011; O'Reilly & Tushman, 2008) that examined innovation in SME's and found that a lack of design thinking is not because of de-valuing of creativity, rather a reduced understanding of *how* to implement a creative culture in co-existence with the incumbent culture.

As a result, many firms preference the use of external design consultancies to either expedite the process of having a product or service available to the market; gather the relevant customer research to clarify the brief or to deploy an idea from start to finish. On one hand, literature suggests that third party designers can be particularly influential in assisting manufacturing SME's to utilise divergent thinking in the design process (Berends, 2010). In other words, helping them to expand on existing ideas and explore other possibilities. Typically, SME's would exhibit convergent thinking due to resource constraints and limited time – utilising a third party design consultant with specialized skills helps them to conceptualize beyond existing capabilities and core activities (Berends et al., 2010)

Alternatively however, literature opposing this suggests that the outsourcing of strategic design work to a third party can be detrimental to the firm's ability to innovate. (Hovanessian, 2008; Mills et al. 1995). Hovanessian (2008) explains that the current business model under which most design consultancies operate contributes to the poor diffusion of design within SME's. While assisting firms to seek new opportunities in the market and be proactive in understanding the customer, they are also bound to work within a specification or brief given of monetary value, which places constraints on the opportunities available. Some consultancies are modifying their business models to serve a more collaborative relationship with the client and to better understand the strategic business goals (Hovanessian, 2008). Some argue that design consultancies should be working to empower the firm to understand their customers *first* hand and to cultivate their own design-orientated language towards innovation. As affirmed by Mills et al. (1995, p 24) who states:

As conditions change over time, manufacturing is likely to continue to be reliant on external help to adapt its manufacturing policies to new

situations… (this) is unlikely to develop manufacturing's ability to create and understand its own strategy.

By taking strategic ownership, it is hypothesised that firms have the opportunity to better control the product or service offering's alignment with the strategic vision in a holistic business sense. From this perspective, empowering firms to find profitable and innovative opportunities and then drive those autonomously will become a fundamental goal of future entrepreneurs. This literature highlights the challenge of design led integration particularly when many SME's often elect to handover core design briefs rather than cultivate and nurture in-house design activities such as new product development.

3.5 New product development

It is important to discuss new product development as it offers pivotal opportunities for design led change. This means that the processes and workflows that scaffold a firm's new product development activity have a large influence on the firm's capacity to conceptualise and execute radical innovation.

The process of designing novel products and/or services in any market is called 'new product development' (NPD) (Cooper, 2006). There is an extensive amount of literature in this area, all of which cannot be included here. Within this review, an overview of the core principals of new product development is provided including how products are classified and accepted into the market as well as the most recognised workflow structure in new product development called the Stage Gate model.

Typically, new product development has been divided into three key segments within literature. The classification matrix, shown below (Figure 3) illustrates new products as Breakthrough, Platform or Incremental.

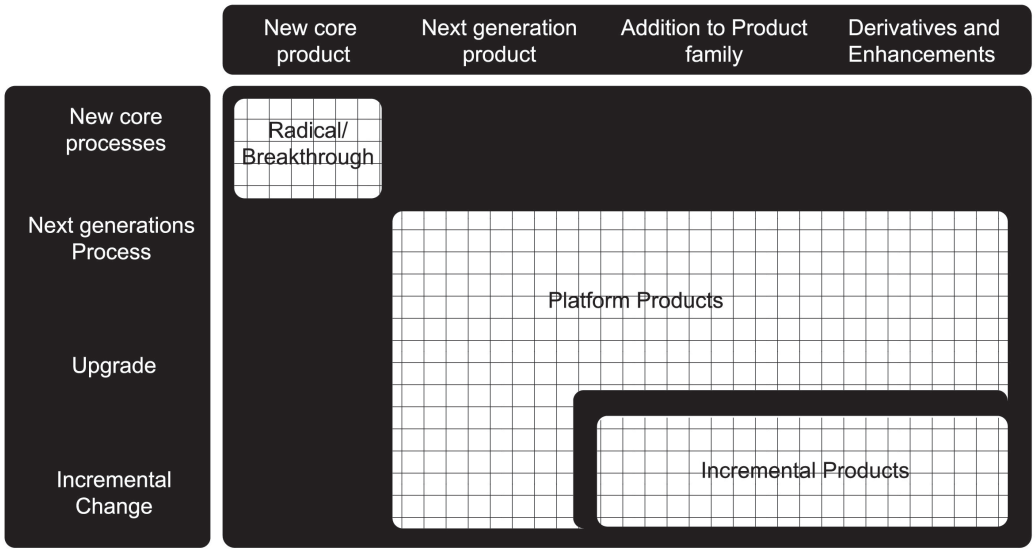


Figure 3 – Classification Matrix (adapted from Wheelwright and Clarke, 1992)

Incremental products are typically those that are introduced for cost reduction, improvements to existing product lines or to fulfil well-identified needs in the current market using pre-existing technologies. In turn, they generally only elicit incremental change during the process of execution. Platform products are the framework or base line products that are developed with an expectation for new generation products or processes to follow. They may be designed with the intention of breaking into newer markets or capturing more market share within the existing market. Breakthrough products or processes are entirely novel in their design and application to the market. These products are perceived to be less accessible and logical for firms to pursue because they are very difficult to predict a return on investment and difficult to achieve within firm's existing capabilities. If successful however, the established market space for breakthrough products or services can be much larger and profitable than the previous two categories (Wheelwright and Clarke, 1992).

However, unlike platform and incremental innovations, which are more likely to be defined alongside the customer, breakthrough products are much

harder to co-define with the customer (Christensen, 1997). ‘Customer needs are tacit and the customers have difficulty expressing their needs beyond the obvious’ (Rajkovic, 2011). Furthermore, the management of the given firm can struggle to logically comprehend how the new product or service can be delivered using new or existing technologies and resources. This emphasises the value of design thinking in being able to better visualise and view new ideas as part of a system rather than as a product in isolation.

The matrix is important to consider in this investigation as it illustrates the degree of change typically required in developing radical products and services. For the majority of firms, including family owned, finding new radical opportunities is challenging as it disrupts the existing core processes and pushes the organisation into unfamiliar and unchartered territory – contributing to a heightened perception of risk. The application a design led approach within a family owned firm helps to gain a better understanding of how this perceived risk affects the firm’s ability to engage in change. New product development will be further explored in the following chapter in relation to how manufacturing firms model the design and engineering process.

3.6 Stage Gate Model

Cooper’s (1983) Stage Gate Model (SGM) is often discussed in conjunction with new product development as the most recognised method of staging development of new products and services. The Stage Gate model (shown in Figure 4), developed by Cooper in 1983 (with extensions in Cooper, 1994) formalises the process of new product development by introducing ‘stages’ which have multiple actions and are then closed by a ‘gate’, designed to audit and validate each action of the project. Each gate is also designed to be cross-functional depending on the stage of the project (Rese et al. 1998).

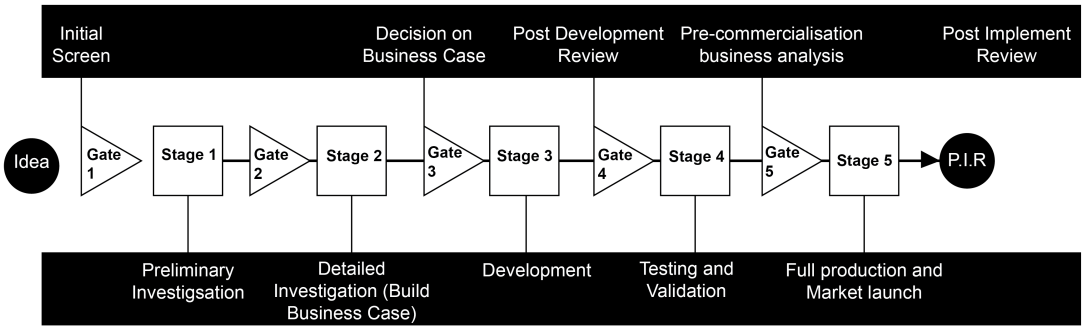


Figure 4 – Stage Gate Model (Cooper, 1994).

A great deal of literature has been conducted surrounding organisation's use of the SGM and it's effectiveness in not only resource efficiency but it's performance in ensuring products or services are released with a strong value proposition (Brun et al. 2009; Barringer and Gresock, 2008). It is suggested that the traditional SGM, which is highly linear, is effective within stable industries and in particular, incremental innovations. This is because much of the problem is already defined, like the market expectations, costs and customer preferences. So easily replicated, organisations often work simultaneously on multiple stage gates to expedite the entire process.

Pursuing breakthrough products or services within the Stage Gate model however presents problems specifically to do with the front end of the process, often defined within the literature as 'The Fuzzy Front end' (Figure 5) (Barringer and Gresock, 2008). Highly ambiguous and an uncertain stage of the process, this is generally where research occurs, unpacking the problem, identifying which customer has the problem and idea generation to solve that problem (Brun et al. 2009). Activities in this early phase of NPD are critical to radical innovation, because the cost and time of corrective actions are low at the early phase where fuzziness is high, and high at the late phases of the NPD project when fuzziness is low (Brun et al. 2009). This means organisations need to become proficient at managing ambiguity in the early phases of concept development to optimise prototyping and exploration of a number of ideas.

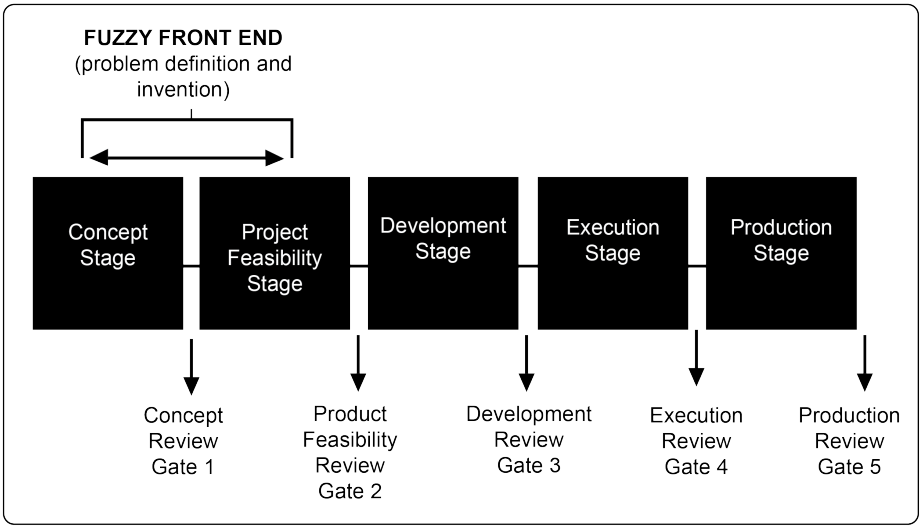


Figure 5 – Fuzzy Front End (adapted from Barringer and Gresock, 2008)

Even so, the presence of ambiguity in the 'fuzzy front' end of new product development remains a major contributor to organisations failing to fully understand the problem and their customer. Consequently, the opportunity to capitalise on radical innovation becomes lessened. This is an important consideration to the study at hand as it may challenge the case firm to re-organise and prioritise resources to spend more time unpacking the problem and less time defining the solution. By doing so, firms can build capability to embrace ambiguous problems rather than either by-pass the stage or abort the project entirely.

Brun et al (2009) attempted to better define the specific sources of ambiguity through qualitatively analysing the experiences of multiple medical device companies engaged in a new product development projects. The results indicated two key dimensions: the subject and source of ambiguity. The noted subjects at the centre of said ambiguity included: product (what is the price, purpose, and context of the product?), market (who is the customer?), process (what process should be used?), and organisational resources (how much time is needed?). The source refers to what *caused* the ambiguity to occur within each subject. For example, a firm may experience ambiguity

about the purpose of a new product because of multiplicity – a great number of people interpreting the original meaning of the product differently. The sources and varying types are shown below (Figure 6):

- Multiplicity: *Different interpretations by multiple people about the meaning of a given subject.*
- Novelty: *Multiple interpretations by one person over time about the meaning of the subject.*
- Validity: *Unrepresentative information about a given subject leads to questioning of validity.*
- Reliability: *Inconsistent information about a given subject leads to questioning of reliability.*

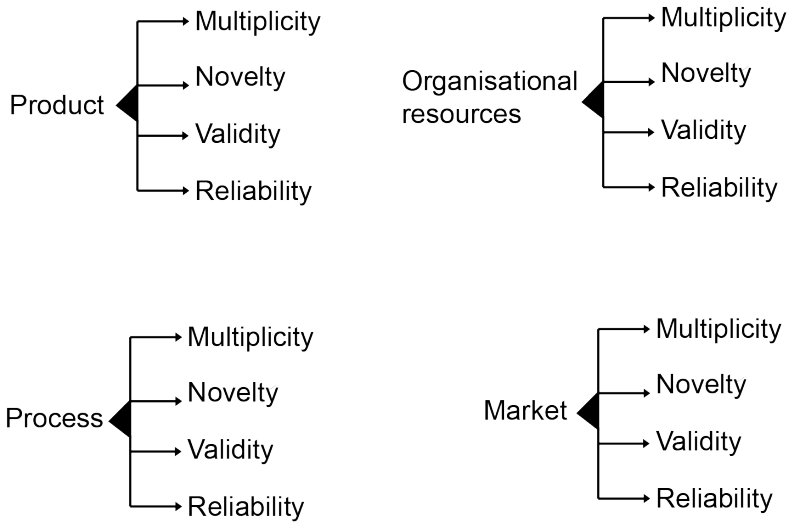


Figure 6 - Brun's (2009) sources of 'ambiguity' in new product development

Stringer (2000) expresses that some family owned firms inadvertently develop a culture where the scope for innovative design of products and services is severely narrowed because the day-to-day activities of the firm are disjointed and complicated. Literature suggests the root of such resistance is through a number of factors including ad-hoc solutions that aren't addressing the source of the problem; the tendency to localise

language and a lack of formalised and audited processes. Ultimately, this may create a disparity between new product development and process thus resulting in quite an ambiguous and fragmented understanding of how innovation can holistically assist the firm (Laforet and Tann, 2006).

3.7 Australia's focus on innovation

To finish, it is important to rationalise the importance of cultivating innovative capabilities within Australia's manufacturing and SME sector. Furthermore, justify why this is important to Australia's economic security in the future.

Despite Australia's high cost environment, its main export and economy booster is due to the mining sector which is commodity driven. This means that in the long term, keeping wealth and prosperity within Australia may become difficult to sustain unless investment is made outside of this sector and into other technological and service based innovations. Roy Green (2006) emphasises the importance of Australia's commitment to invest in human capital and infrastructure, identified as commonalities across all countries that are successfully innovating. At a macro level, this means laying the learning foundations in schools, universities and vocational education. By doing so, strengthening the network of knowledge between institutions and enterprises.

This supports literature on Australian manufacturing and the broader Australian business sector where successful, innovative firms do not operate in isolation from the external business and public policy. Described as national 'systems of innovation', these firms are part of emerging knowledge-based economies, which are typified 'sets of institutions which support not only the internal capabilities of firms and organisations but also the interrelationships which allow them to realise their full productive potential,' (Green, 2006, p. 5). This is supported by Goran Roos (2012) in two reviews

of South Australia and Queensland's manufacturing industry where key opportunities for the sector included:

- Accelerating the transfer of knowledge and information between companies, and between business and education and research bodies.
- Broadening industry's understanding of innovation to include organisational and business model innovation, rather than centering on technology innovation.

Australia as a high cost country will be left behind other countries if it does not cultivate and develop innovation in technology, products, services and business models within Australia, for Australia and for Australian export. The OECD's (2009) global study examining innovation in firms conducted a comparative analysis of how countries rate against each other regarding their performance output of novel innovation. The study revealed Australia as majority 'domestic modifiers' which means they are only operational on the domestic market and tend to adopt international 'new-to-market innovator's' products and services within Australia. Ultimately, meaning Australia needs to be more proactive about generating new-to-market innovation out of Australia.

Previous Australian government initiatives like the Prime Minister's Task Force have been introduced to target innovation in the Australian manufacturing sector. Introduced in 2011, the initiative aimed to identify new skills and capability to assist manufacturing firms to compete in the changing global landscape, move up the value chain, link with high-quality research and developments in universities and TAFEs and finally, build the skills to access the capital it needs to re-tool and re-equip (Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, 2013).

This research, conducted as part of a government and industry program, works towards establishing Australia's innovation capabilities through understanding more about the barriers SME's encounter in trying to innovate. Moreover, applying the design led innovation framework as an effective approach to motivate change and shift a firm's ability to find new avenues for innovation. Expanding Australia's capabilities on a micro or firm level can in turn contribute to achieving a national 'systems of innovation'.

3.8 Summary

This chapter addressed the process of new product development within manufacturing environments. This included the balance between design and engineering, the tendency for manufacturing firms to outsource strategic design work to third party design consultants and finally the need to overcome ambiguity in the early stages of new product development. All of the elements discussed in this chapter could present some challenges in integrating a design led approach with processes like new product development.

The literature indicated that the effect of SME's outsourcing strategic design work to third party consultants could be both positive and negative. By outsourcing the work to an external entity, research has shown SME's to be challenged in their assumptions of the design and pushed further than if they had been working in isolation. Alternatively, research suggests that relying on third party consultants to develop strategic design briefs limits SME's ability to orchestrate and manage their own strategy as well as think critically about the firm's strategic orientation.

Lead by a strong engineering culture, the case firm may be challenged to overcome existing product development routines to integrate a design led approach. The research outlined in this chapter is relevant to the sub-research question stipulated at the beginning of this thesis. *Could family firms where decision makers are often long-term proponents of the dominant*

culture benefit from nurturing innovation from a bottom up approach rather than from top down approach? As new product development typically resides in the operational area of the business, these employees play an integral role in manifesting the vision of the firm into new products and services but may not have the agency or authority to challenge and inspire new ideas.

Chapter 4: Design led innovation

4.1 Introduction

This chapter examines the framework of design led innovation, which is the theoretical basis of this research. This includes the role of radical and incremental innovation and its alignment to the design led approach. Following this, design driven innovation will be introduced and its relationship with radical innovation. To conclude, the design led approach is broken up into three key areas. Design thinking, which can be seen as the activity under which design led innovation is demonstrated. Secondly, the design led innovation framework, which is lived through firm employees utilising design thinking. Finally, design integration is discussed as a resultant title for firms that have been able to fully integrate a design led approach through instilling a culture of innovation.

The role of design in business has transferred from a downstream activity to an important skill in capturing and applying new knowledge to deliver strategic value at the core of business operations. The value of design comes through capturing new knowledge and the designer's ability to consistently reframe scenarios and possibilities in close creation with customers. Traditionally, design has been practiced in a fairly deductive manner – working from a broad range of ideas and concepts and gradually placing constraints around those concepts through prototyping and observation. Although there are a number of variations, Neumeier (2008) summarises the traditional process as i. Discovery, ii. Ideation, iii. Refinement, ix. Production. Business executives can engage quite comfortably with this, as the design can be 'managed, tracked, compared and measured like manufacturing' (Neumeier, 2008). Highly linear in approach however, this model sustains a very isolated focus of the business, generally on tangible assets like product.

Whereas, according to Bucolo and Wrigley (2012), design led innovation:

"…allows firms to reframe their innovation efforts and to move beyond a product only strategy. Key to this approach is the ability of the firm to build deep customer insights through co-design. These insights are then evolved with the firm's internal and external stakeholders, and mapped as innovation opportunities to all aspects of the business."

The changing marketplace in the global economic environment has lead companies to re-visit the way their business models generate customer value. Consequently the interest and investigation into business models and business model innovation has grown significantly. The UK Design Council has followed the experiences of a number of companies who have been able to achieve radical innovation through design led innovation. They also have quantitatively documented the immense success of design led innovation in business within the UK. For example, they tracked publically quoted firms that used design intensively over a ten-year period between 1994 and 2004 and compared them to poorer design-orientated firms. The design intensive firms outperformed their peers by 200% through both strong and weak markets. Furthermore, they found that UK firms ranked design as the 6th most important factor driving business success. This outranked both R&D and marketing (UK Design Council, 2011).

There is no doubt of design led innovation's value as shown through the success in other parts of the globe like the United Kingdom. The challenge is now for Australia to overcome institutional and organisational barriers in order to integrate design led innovation and remain competitive. Studies such as this one assist the adoption process for family owned SME's through identifying the key opportunities to harness change.

4.2 Two key types of innovation

There are two key forms of innovation as the basis of the literature review, incremental innovation and radical innovation, which is sometimes also referred to as disruptive innovation. It is understood that both forms of innovation are critical in the sustainability of industries and the businesses within those industries. As described by Verganti and Norman (2012, p.6), “Without radical innovation, incremental innovation reaches a limit. Without incremental innovation, the potential enabled by radical change is not captured.”

Verganti and Norman (2012) define incremental innovation as “Improvements within a given frame of solutions (doing better what is already done)”. Incremental innovation sits more comfortably with most organisations because the outcome generally capitalises on the same strengths, capabilities and processes of predecessor products. Consequently, incremental innovation can be achieved more easily and consistently.

While radical innovation is defined by Daneels (2004) as “a technology that changes the bases of competition by changing the performance metrics along which firms compete”. Radical innovation is a key goal of the design led approach. This is where organisations fast-track growth and sustain a competitive edge for a longer period of time. It does however elicit a higher degree of risk on the part of the firm because radical innovations generally create inimitable business model compositions that present as unfamiliar and risky propositions. Equally so however, radical innovations also create unrivalled customer value propositions.

4.2.1 Incremental innovation

Incremental innovations typically improve performance of existing products along the dimensions that mainstream customer’s value (Verganti and Norman, 2012). These innovations have the capacity to advance

organisations, but not at the pace required to combat strong international competition and more importantly, not at the level to increase customer market share. With measurable and foreseeable outcomes, incremental innovations are undoubtedly a preferred path of innovation for family owned firms because they generally sit within the scope of what existing resource capacity can handle and the knowledge required in executing the innovation. However, incremental innovations are an integral investment of every business; without them, most firms could not financially sustain themselves.

For this reason, this thesis helps to gain a better understanding into how family owned firms transition beyond just incremental innovation to radical innovation. Identifying the key barriers that family owned firms face in identifying new market spaces and managing change will be imperative in assisting this segment to find new radical innovation opportunities.

4.2.2 Radical Innovation

A radical innovation is a product or service that is released into a market, which essentially doesn't exist yet. Here, the firm reaps the advantages of orchestrating an entire market segment (and their competitors) through the control of customer preference.

To further unpack how radical innovation has such an impact on the market, the types of customers that diffuse new innovations throughout the market are important to discuss. A disruptive innovation is initially recognised by a small, niche group of consumers who *positively* value what the majority or mainstream group of consumers perceive to be 'weaknesses' in the product (Christensen, 1997). As time progresses and the innovation develops, the mainstream market who generally have less demanding needs follow suit in adopting the new technology, product or service.

Everett Rogers (1962) pioneered a psychographic model of the consumer base in relation to their preference and uptake of innovation (shown in Figure 7). The model consists of innovators, early adopters, early majority, late majority and laggards (Moore, 1991). They are described as:

- Innovators: make up a small portion of an entire market but are key as they are the primary endorsers for the innovation diffusion. Technology is a central interest of their lives and the intrigue of new products generally makes them key holders of knowledge around product performance (Moore, 1991; Rogers, 2003).
- Early Adopters: are less driven by technology as their predecessors, the innovators. Instead they are driven by their own intuition and visualisation of how a given product or service could add value to their life. More discerning and objective in their decisions, early adopters are likely to be more influential with the successive consumer groups (Moore, 1991).
- Early majority: are even more pragmatic when it comes to new technology and are driven predominantly by the perceived *practicality* of a new product. Relying on an established base of references before making a purchasing decision, the early majority provide the basis upon which real profits and return on investment are seen (Moore, 1991).
- Late majority: are less receptive to new technology and wait until there is a strong support network of users before committing to purchase. Again a large consumer group, this segment demands an expansion in selling costs for the seller but also marks the ROI for R&D capital expenditure (Moore, 1991).
- Laggards: are completely at ease with their lack of technological uptake. Reducing back to a smaller portion of consumers, some researchers suggest they are not worth pursuing in any capacity while others suggest that they are perhaps visionaries of even more

advanced innovations and so are important to maintain awareness of (Moore, 1991, Rogers, 2003).

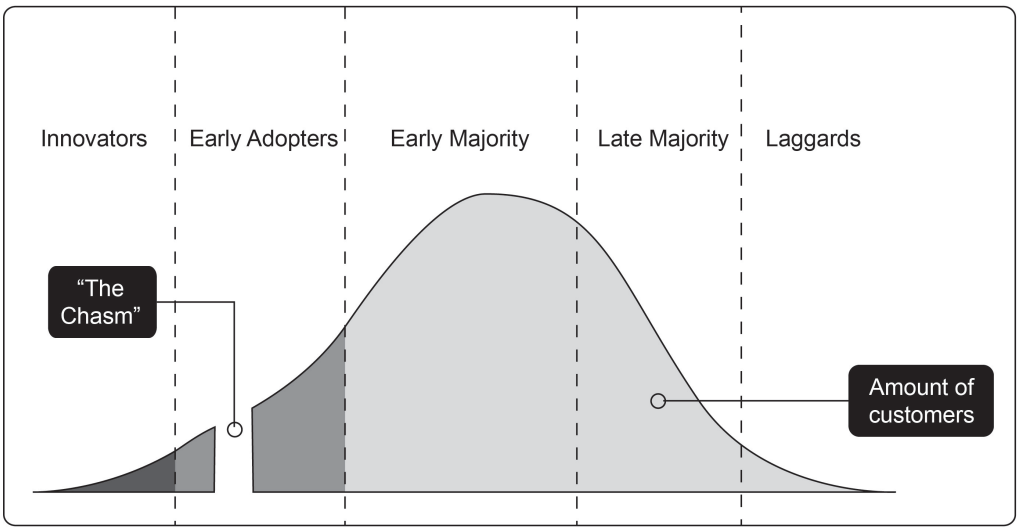


Figure 7 – Technology Adoption Lifecycle (Moore, 1991).

A defining element of Moore's (1991) contribution is what is termed as 'crossing the chasm', which is a gap that exists in the consumer base between the early adopters and the early majority. Applicable only to discontinuous or disruptive innovations, Moore explains why so many firms have difficulty making the jump between the 'visionary' (innovators/early adopters) and the 'pragmatist' (late majority/laggards) consumer groups. Essentially a balancing act whereby firms try to encourage the visionaries to advocate the product to make the purchase decision easier for the pragmatist while also trying to maintain a sense of 'exclusivity' that appealed to the visionary in the first place.

Without detailing the strategies in which Moore (1991) stipulates in trying to cross the chasm, it is important to note the speed of which innovation is now occurring and its effect on business' ability to get traction in the market. More recently, research has documented the lack of 'handover' between innovators and early adopters due to the speed at which a new innovation replaces the interest of the 'innovator' (Christensen, 1997). This presents

some unprecedented challenges in how firms segment their customer base and identify untapped, profitable market space that can sustain new products for the long term.

4.2.3 Finding radical innovation opportunity

Ultimately, radical innovation has the ability to transform a firm's brand and competitive advantage through delivering value to new markets and shifting entrenched change parameters (Verganti and Norman, 2012; Bucolo and Matthews, 2010). However, the greatest difficulty lies in shifting the traditional methods and approaches of the company to allow radical innovation opportunity to be found and acted upon. This is because the opportunities for radical innovation are a lot harder to predict and understand in the scope of existing capability, culture and process both within the company and in the marketplace. Design led innovation helps firms to see such alternative scenarios by prototyping business models and visualising new value propositions to the market.

Furthermore, creating new business model scenarios and radical innovation warrants new ways of research and development. Verganti and Norman (2012) suggest that through the continued research of "existing human behaviour, activities and products", firms unknowingly get trapped in the existing paradigms and therefore channel incremental innovations only. This implies that the methods in which firms have previously relied upon in defining their markets are no longer sufficient when examined in isolation. Rather radical innovation opportunity requires a much broader net of inquiry that is continually cast over all facets of internal business areas and all key stakeholders in the value chain (Bucolo and Matthews, 2010).

The opportunity for radical innovation within business is discussed extensively in literature by Christensen in his book 'The Innovator's Dilemma (1997). 'The Innovator's Dilemma' discusses why large, successful firms fail

at innovation and the principal ideas that could affect the outcome.

There are five main principals, which are outlined below:

	Principal	Implication of Principal
1	Companies depend on customers and investors for resources.	The allocation of resources is ruled by the funding source (customer or investor) which means the decision to invest is always driven by either an attempt to forecast consumer demand or satisfy investor desire.
2	Small markets don't solve growth needs of large companies.	New and unproven markets are not profitable enough in the short term to warrant sufficient attention.
3	Markets that don't exist can't be analysed.	Using traditional market analysis techniques will not lead to disruptive innovation, rather to the sustaining of existing incremental progress.
4	An organisation's capabilities define its disabilities.	A firm relies fundamentally on every organisational facet to be conducive to innovation and innovative cultural success.
5	Technology supply may not equal market demand.	As a firm continues to innovate they will find it increasingly difficult to satisfy the mass consumer and risks opening themselves up to more competition by adding more technological capability.

An innovative company mitigates the risk of each of these principals by purposefully challenging the existing paradigms that has achieved continued growth. They recognise the need to do this for the sake of meeting a much more profitable market when it outgrows the incumbent competitor offerings (Christensen, 1997). To do this however, Christensen (1997) notes that firms also need to be prepared for the possible displacement of their own existing product families, which no longer serve the larger and more profitable market segments. Christensen explains that by a firm purposefully attacking their own product families or lines, this is protecting smaller competition eroding it

before them.

Yet, a key criticism of Christensen's theory is its practical application and implementation to businesses. Christensen (1997) remains sceptical about business' ability to both 'exploit existing capabilities while exploring new possibilities'. In his view, firms cannot concurrently explore and exploit but must spinout the exploratory business to succeed (Christensen, 1997; O'Reilly and Tushman, 2008; Corso and Pellegrini, 2007). This is because if the organisational culture is not conducive to enabling 'outside-the-box' view – Christensen believes it is very difficult to marry the existing cultural values and strengths with new opportunity in radical innovation.

However, others believe separating the businesses can be detrimental through lost synergies with purchasing, information sharing, branding, cross promotion and customer service (Corso and Pellegrini, 2007). With foundations in management theory, critics suggest that a vast array of other factors contribute to the successful tuning of an organisation towards radical innovation, for example: knowledge management and organisational learning. Furthermore, they suggest that other theories in business model innovation such as dynamic capabilities or organisational learning are more relevant to businesses today.

The strategy surrounding how firm's balance both exploitive activities in existing markets and exploratory activities into new markets is enormously complex and consequently difficult to execute by businesses. This is because it is challenging for firms to be able to visualise and understand the possible market futures and furthermore how those unknown futures are built into successful business models. Design led innovation (which will be discussed in detail in the remainder of this chapter), reduces the uncertainty and ambiguity surrounding the exploration of new possibilities in a number of ways. Most succinctly, through combining fast prototyping of scenarios that examines the new product, service or business model from multiple

perspectives and stages of its life cycle. This then facilitates the conversion of tacit knowledge into explicit knowledge, which can be articulated into operating procedures and business structures (Corso & Pellegrini, 2007).

4.4 Design driven innovation

As introduced at the beginning of this chapter, a close peer model of design led innovation is design driven innovation, which proposes innovation as largely dependent on the creation of new meanings through a close understanding of the socio-cultural dynamics of the customer base. Verganti (2009) leads the literature on design driven innovation with the core theoretical founding being that innovation through design is about innovating meanings. Verganti's (2009) perspective emphasises the designer's influence of innovation on the intangible social constructs of a product such as symbolic meaning rather than tangible product centric influencers. Consequently, Verganti (2009) proposes that firms need to act as social interpreters deriving meaning from a number of key stakeholders/actors such as media, artists, other designers and organisations; who are influencing the trends, constructs and needs of consumers.

As a result, the application of design driven innovation cannot typically be driven through traditional scientific methods of information capture such as customer insights. As Verganti (2008 p.438) explains:

"*The socio‐cultural context in which they (consumers) are currently immersed makes them inclined to interpretations that are in line with what is happening today. Radical changes in meanings instead ask for radical changes in socio-cultural models, and this is something that might be understood (and affected) only by looking at long-term phenomena with a broader perspective."*

Instead, many new products and services that are developed through the traditional scientific methods such as phase analysis, organisational structures, or problem-solving tools are released as a market-pull product or service (essentially sits within the scope of what customers know they want). Whereas design driven innovation produces a radically different experience for the consumer by fundamentally changing the meaning of products and consequently how the consumer interprets themselves in relation to use of the product or service (Figure 8) (Verganti, 2009; Rampino, 2011). As Figure 8 illustrates, the theory places generating new meanings as equally integral to the creation of radical innovation as technological innovation (Verganti, 2009). Establishing what those meanings constitute, design driven innovation is about taking 'proposals' to the customer in an effort to establish future socio-cultural models.

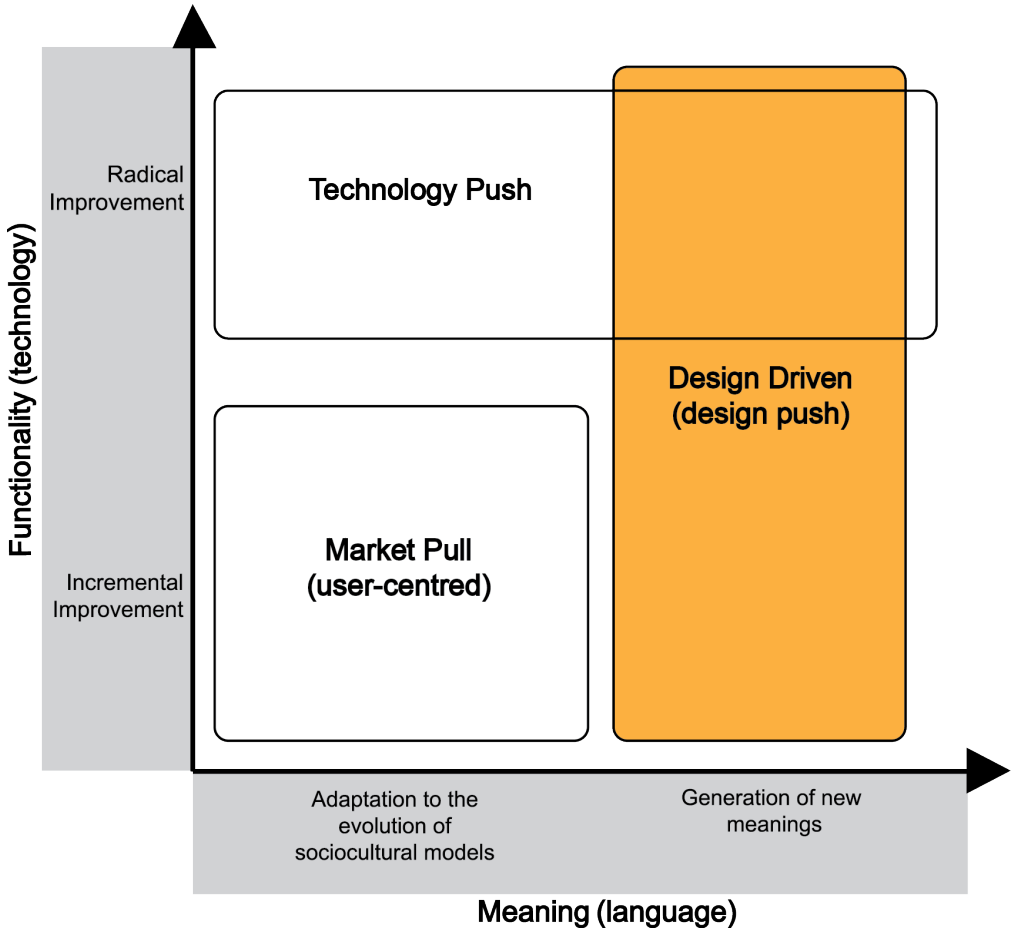


Figure 8 –Design Driven Innovation (Verganti, 2009).

Rampino (2011) offers an alternative, deconstructed view of design driven innovation, categorising its influences and divisions separately. In figure 9, three key design ‘levers’ are identified as the beginning of the creative process, laying the foundations of innovation. These are form, technology and the mode of use. Rampino (2011) then proposes four design outcomes varying in their alignment to incremental or radical innovation. Each outcome builds on one another to reach another level of innovation.

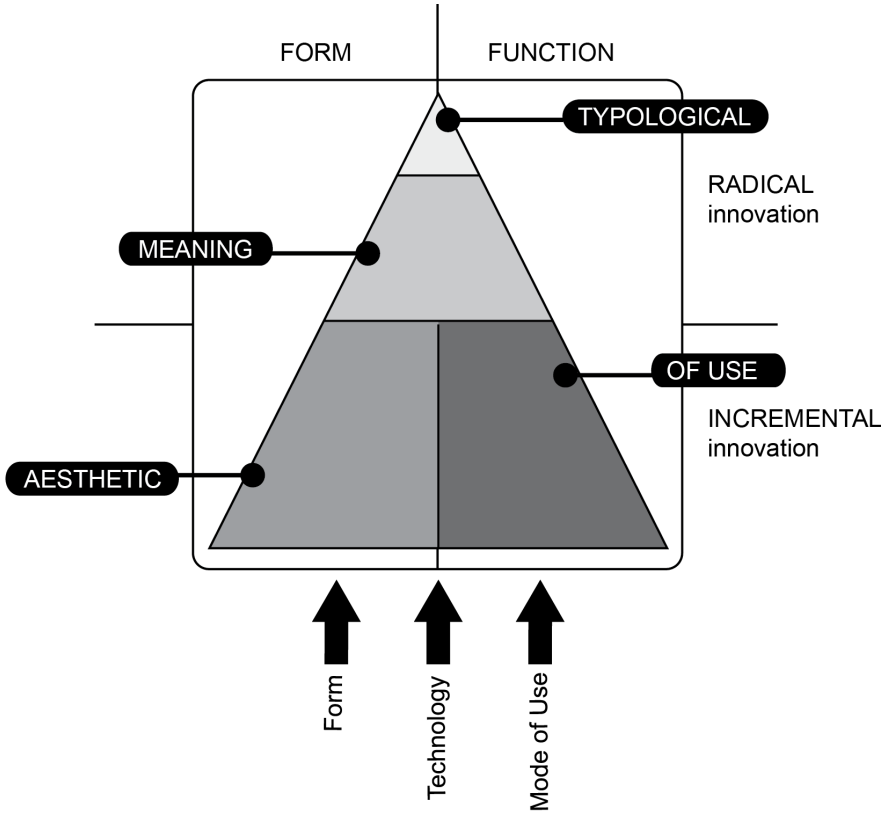


Figure 9 - The Innovation Pyramid (Rampino, 2011).

These include:

- Aesthetic Innovation: is related to the product's visual appearance and the degree to which it differs from competing products. Predominantly an outcome that, in isolation, can progress products with incremental innovation only.
- Innovation of Use: is related to the degree to which the product positively alters usability. Innovation of use is a common outcome in industries that have high user interaction. Consequently these industries commonly grow through incremental innovations.
- Meaning Innovation: is related to how the consumer interprets the product and the meaning incurred through key symbolic, cultural and social cues. A key indicator of radical innovation, meaning innovation transcends existing socio-cultural values to create new user experiences.
- Typological Innovation: is related to the deviation of a product from its formal archetype. In this instance, innovation occurs through a new product becoming the 'dominant design'. A dominant design is a product which defines the market-accepted basic architecture in a specific product category (Rampino, 2011)

Rampino's (2011) model of design driven innovation brings together a number of design-based theories and posits a hierarchical view of innovation types. These theories have typically taken on a product centric focus, therefore limiting the possibilities for radical innovation in business models.

Design led innovation has also been defined as design driven innovation by various authorities on the topic. Verganti's theory however does not draw a definitive connection to the business model as a critical and overarching component of a sustainable and innovative design proposition. As explored by Battistella et al (2012), 'Design driven innovation…explains innovation on the products and links it with the surrounding organisational system through

the “design discourse”, but it does not consider the innovation on the entire business model’.

4.3 Design thinking

At the core of design led innovation and design driven innovation is ‘design thinking’ which is thought to be the ‘cultural basis’ upon which other frameworks for innovation have been built. Leading the discussion is Tim Brown, founder of IDEO who describes design thinking as "a discipline that uses the designer sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity" (2008, p.86).

Design thinking removes design from being an isolated, departmentalised activity to an instinctive approach that can be undertaken by any one person within an organisation. Instead of activating design downstream in the operational side of an organisation, design thinking emphasises the role of the design as an imperative asset in creating customer experiences (rather than products) at *all* stages of new product development but particularly in the early problem identification stages. Neumeier (2008) discusses how often firms fall down because they jump from the ‘knowing’ to the ‘doing’ and fail to incorporate an absolutely critical component - ‘making’. Designers as naturally visual people have the ability to operate between the ‘knowing’ and ‘doing’- they are able to reframe ideas through reflective action and prototyping. The advantage of this within a business application is that pre-emptive action, tests and validates assumptions made on the part of the firm before financial and resource commitment (Bucolo and Matthews, 2010).

Still, design thinking, as a function extends further than the use of tools or procedures within a specific department of a firm. Design thinking goes beyond being an isolated discipline to being *a culture of creativity*; where creative thinking is not bound to product or service departments but is seen

as the way in which companies *as a whole* solve problems. Typically this is averse to traditional corporate thinking because it may be seen as insufficiently managing resources, slowing progress or as something that can already be solved as a part of other existing departments (Neumeier, 2008). Brown and Wyatt (2010, p.35) discuss the difficulties in integration of design thinking:

"One of the biggest impediments to adopting design thinking is simply fear of failure. The notion that there is nothing wrong with experimentation or failure, as long as they happen early and act as a source of learning, can be difficult to accept. But a vibrant design thinking culture will encourage prototyping—quick, cheap, and dirty—as part of the creative process and not just as a way of validating finished ideas."

Design thinking is increasingly looked towards as a better way to unpack complex problems and translate insights into value for the firm. Typically, firms utilise conventional problem solving approaches in their day-to-day operational domains (ie. 'what' plus 'how' leads to 'value') (Dorst, 2011). Essentially, creating a new 'something' to solve an immediate problem while keeping the 'how', and 'value' constant. When this formula fails however, organisations struggle to fathom why the traditional methods of creating value for the customer are no longer working. In these instances, design thinking proposes a different way of deconstructing problems, often by finding novel insights that exist on the peripheral of the problem to cue new ideas and market opportunities (Dorst, 2011). Design thinking therefore better defines the problem by unpacking the true meanings found in the interactions of all relevant stakeholders.

One of the core outcomes of design thinking is generating greater success through collaboration of various stakeholders. Stripped back, the advantages of collaboration and design thinking are essentially related to empathy and the opportunity to understand alternative perspectives than one's own. An

environment that formally facilitates this kind of approach reaps benefits such as: (Simons et al. 2007):

1. Finding inspiration from a very wide range of sources;
2. Collaborating radically (through brainstorming, co-habitation and consistent language);
3. Sharing knowledge – and making it easily accessible to others;
4. Exploring options and ideas early to clarify assumptions

Design thinking provides the foundations for an organisation to better absorb, understand and solve complex problems. This is done through a 'systems' approach whereby focus does not centre on the product in isolation but the product as an integrated customer experience. Design thinking creates products with stronger customer value propositions because rather than treating every stage of development as a different process undertaken by different divisions in the company (Norman, 2009). Areas like R&D, manufacturing, packaging, sales, and service are conceptualised, and prototyped in reference to each other as an integrated offer to the customer.

Design led innovation uses design thinking to leverage this integrated approach to business model innovation. It helps organisations to take on a companywide approach to stimulating competitive difference and sustains growth by being responsive and fluid to market change. Within this research, the firm's capacity to take on design thinking, as a central capability, will play a significant role in sustaining a design led approach.

4.5 Design led innovation

The purpose of this research is to understand the challenges that arise in trying to integrate design led innovation into a family owned SME. This means unpacking the barriers that restrict the firm transitioning from incremental innovation to radical innovation.

Design led innovation (or DLI) examines every core facet of the business, to realign business strategy with customer needs and possible market futures. “DLI helps you get closer to the market and identify latent market needs but more importantly transform this into strategy, which drives products and services” (Bucolo, 2012, p. 23).

The research project presented within this thesis uses a design led approach in examining the potential for radical innovation within a family owned manufacturing SME. Figure 10 shows how the basic core of the theory sits between the overlapping sections of business, technology and user. Effectively, it suggests that all three areas need to be considered when changing or innovating another. By taking on this holistic perspective, firms are able to better identify the true impacts and value of ideas from earlier on in a project. Thus, the final design solution is not presented as an artifact in isolation, but as an integrated product/service which anticipates future user needs, builds future proposals and encourages feedback (Bucolo & Matthews, 2011).

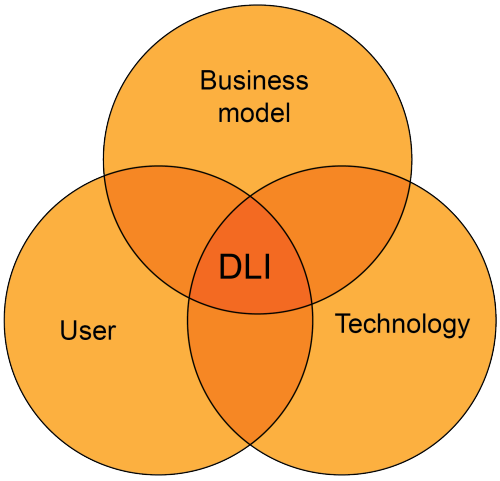


Figure 10 – Positioning of DLI: Technology, Business Model and User Needs (Bucolo & Matthews, 2011)

Design led innovation pays particular attention to how exactly firms integrate and formulate a strategy towards radical innovation. Businesses are

fundamentally unique to one another, each having different complexities of systems, goals, products and strategies. In this sense, there is no 'one fits all' approach for transforming to a design led firm. Absolutely critical however, is that firms, particularly established firms with engrained cultures and processes, recognise the fundamental importance of including all facets of a business when considering both the user and technology.

Firstly however, it is important to gain an understanding of the existing models that act as 'scaffolding' to the design led innovation framework. Although many variations exist, The Design Thinking Cycle (shown in Figure 11) 'entails both analytic and synthetic elements, and toggles between the theoretical (abstract) and practical (concrete) realms' (Beckman and Barry, 2009)

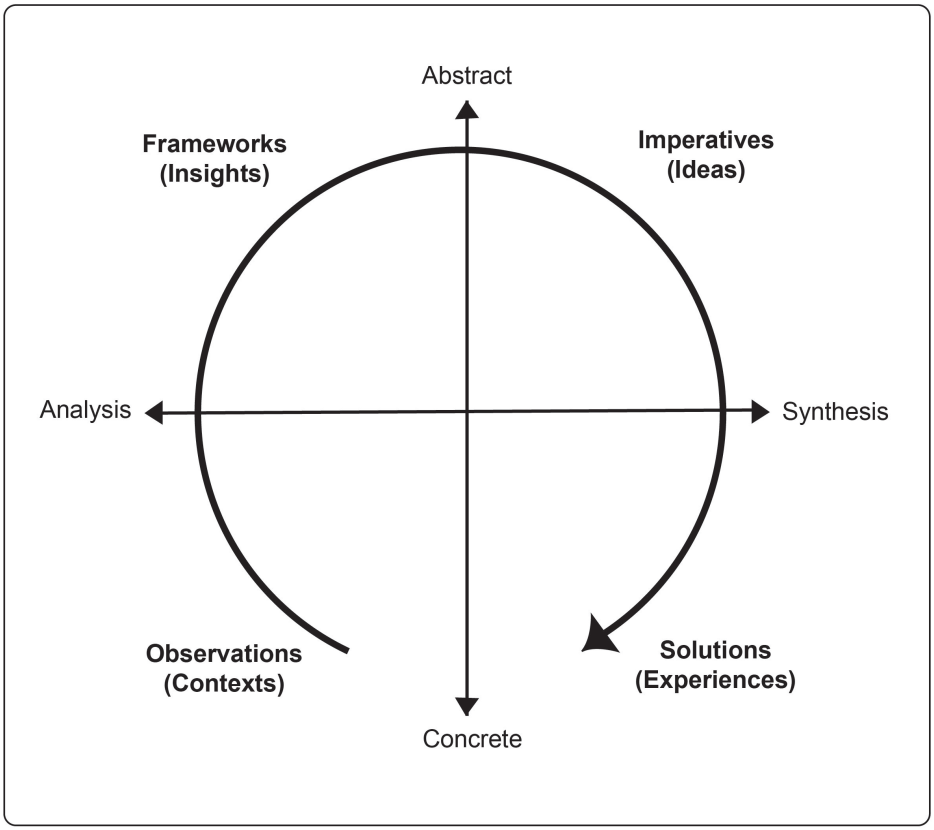


Figure 11 – Design Thinking Cycle (Beckman and Barry, 2009).

The abstract (top half) is where designers typically ‘focus on working within the internal dimensions to generate new ideas based around given constraints that are generally provided to them.’ On the other hand, a business perspective typically prefers the ‘external and strategically focused dimension, or concrete world (bottom half), and focuses on ‘experiments’ of known problems’ (Bucolo and Wrigley, 2012). Optimally, a firm would utilise such a model to find true competitive difference by unpacking the problem and generating multiple ideas based upon the insights captured from the customer (see indicated arrow sequence).

In reality however, those that are key decision makers within firms tend to operate in the concrete world of known problems and foreseeable outcomes. As shown in Figure 12, this is shown through a propensity to immediately transition from having an understanding of the customer (observations) to designing the outcome (solution). Ultimately, this restricts ideas to incremental innovation because the true meaning of the problem is not uncovered through deeper design investigation. Further stressing the importance of marrying the design and business perspectives to generate radical innovation.

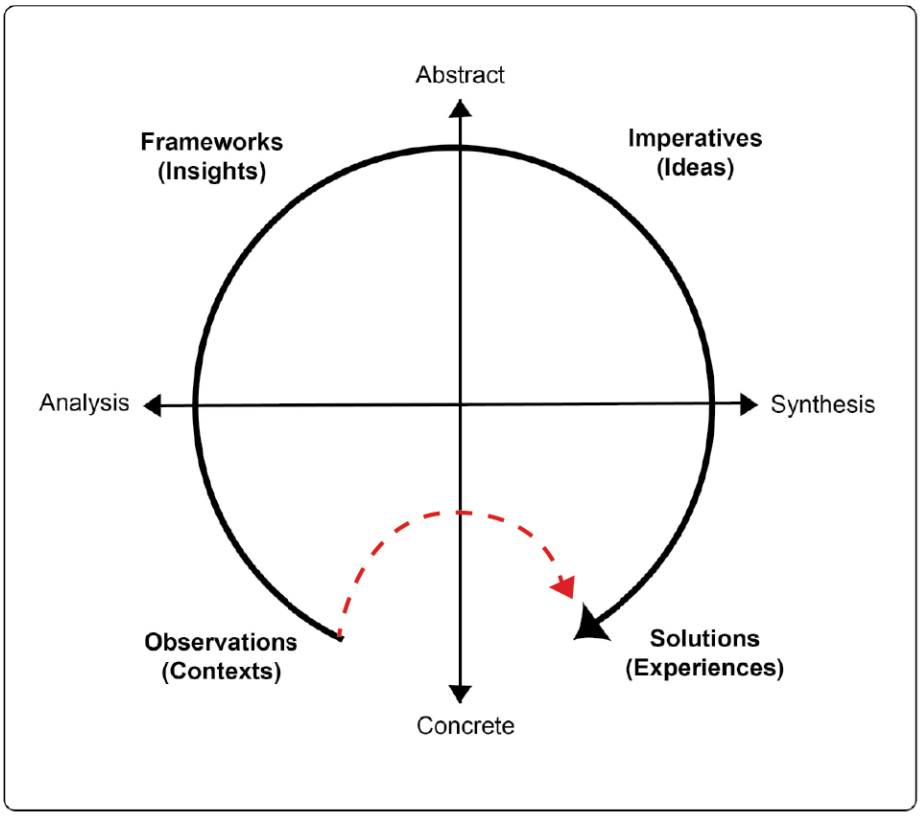


Figure 12 – Adapted from the Design Thinking Cycle (Beckman and Barry, 2009).

Bucolo's design led innovation framework incorporates some principles of the Design Thinking Cycle but introduces key elements of a business make-up: the internal and external paradigms of the firm and the operational and strategic levels of the firm. The framework guides design concept maturity by mapping all aspects of the business and understanding how each aspect has the 'ability to inform the opportunity and create change and growth.' The design led innovation framework will be discussed in two parts, operational and strategic.

Figure 13 below shows the operational side of the framework, which shows direct comparison to the design thinking cycle discussed previously. Here, the sequence (shown through the direction of the arrows) suggests that narratives can be created to reframe and generate multiple instances of

ideas and insights, which are then co-designed with the customer to find a solution. This represents one sequence of the design led framework from an operational point of view to envisage future scenarios.

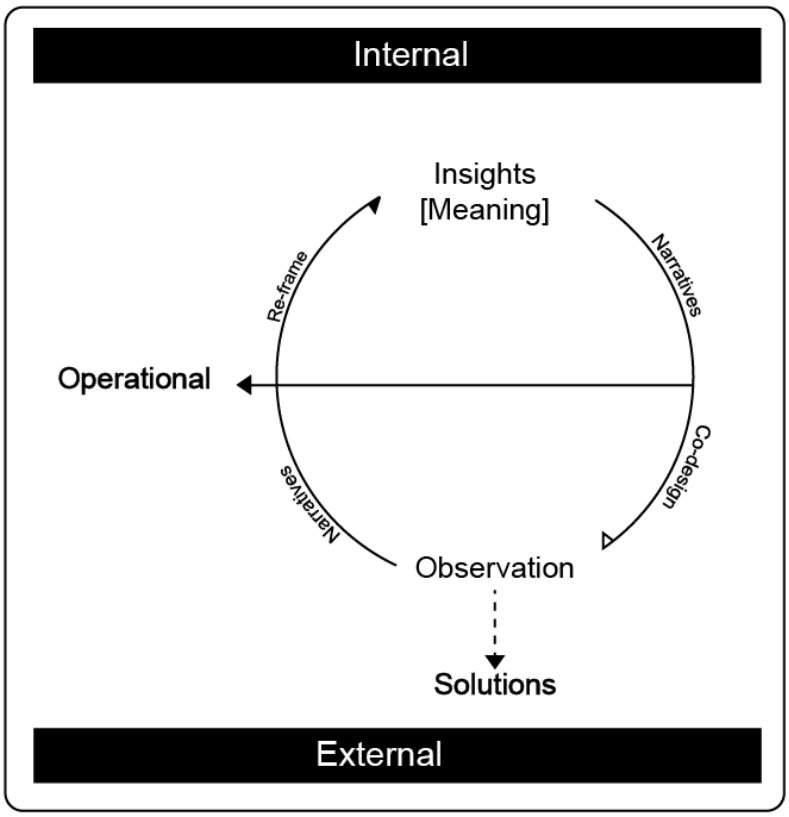


Figure 13- Operational side of Bucolo's (2011) Design led innovation model

The differentiating factor of the DLI model is that it recognises radical innovation as requiring a unified approach from both the operational and strategic sides of a business. Therefore, the strategic orientation of the business model is required in the prototyping process to parallel the operational side and enable a holistic 'source of new knowledge to be integrated' (Bucolo and Wrigley, 2012). Figure 14, shows how prototyping on the strategic level focuses on generating competitive advantage through managing necessary trade-offs, activities and resources that are required to execute the value proposition. Furthermore, how the new value proposition translates into the vision and brand of the firm.

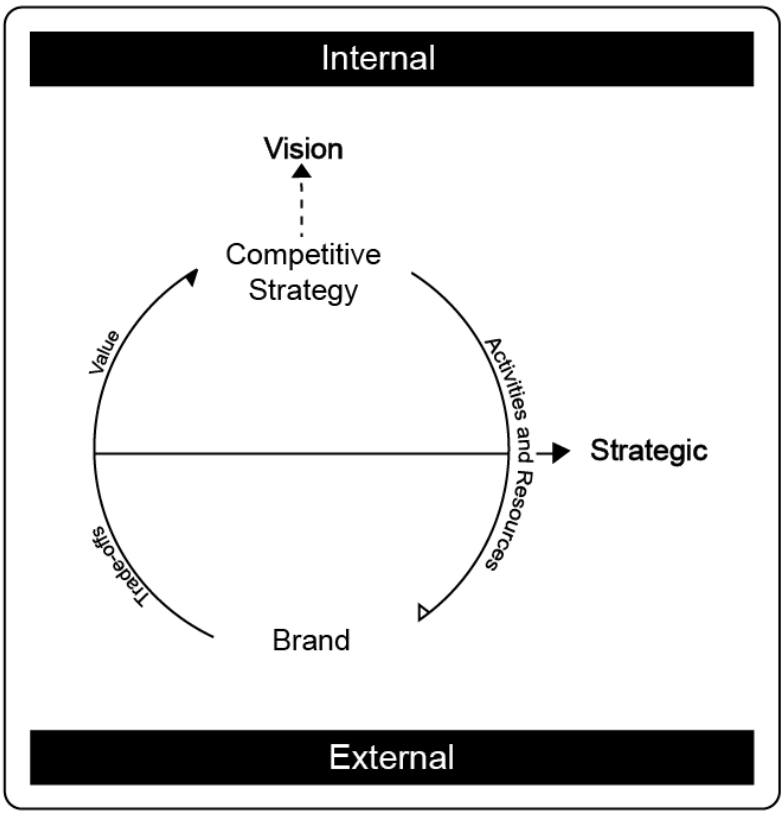


Figure 14 - Strategic side of Bucolo's (2011) Design led innovation model

Prototyping these cycles without each other is costly in that assumptions are made about a multitude of factors. For example, assumptions regarding the alignment between design proposition and financial investment or customer expectations and company vision. Alternatively, the completed framework represents an integrated design proposition framing the whole organisation (shown in Figure 15).

From this perspective, firms who are design integrated 'consistently seek to integrate knowledge from the abstract and concrete worlds to test assumptions and to build new knowledge' (Bucolo and Wrigley, 2012). Here, the opportunity or proposition is central and dependant upon the continual assessment of both the strategic and operational segments of the business and the internal and external faces of the business. Where design would traditionally sit in the abstract left quadrant and be limited to a product centric

scope, design led innovation broadens the scope to view the entire business model as opportunity to channel innovation and execute a stronger value proposition.

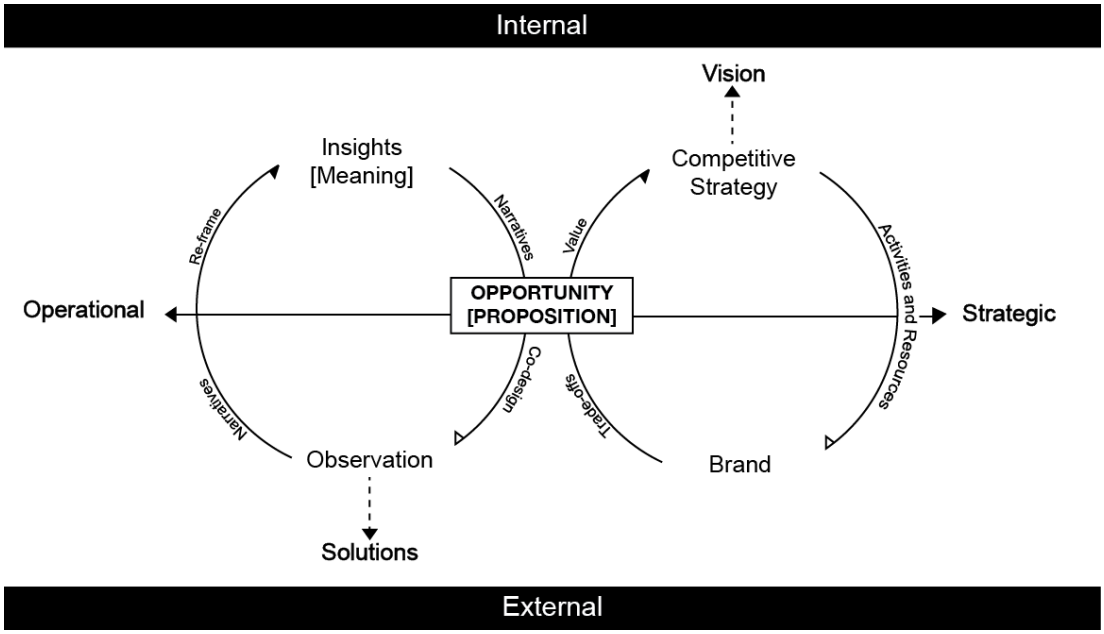


Figure 15 - Bucolo's (2011) Design led innovation model

As the framework suggests the loops are continuous prototyping cycles, which can also be termed as 'reframing'. Framing is a term commonly used within design literature (Schon, 1983) for the creation of a (novel) standpoint from which a problematic situation can be tackled. In the design led innovation model, reframing refers to repeatedly understanding a scenario from multiple perspectives including in past and future, directly and indirectly, emotionally and methodically.

Reframing scenarios is a key element of Bucolo's (2011) design led innovation framework (Figure 15) where 'reframing requires the firm to take an observation and translate this into meaning rather than solutions.' This is important as it challenges the businesses to unpack the true conflicts, gaps

or bottlenecks operational within the business model that perhaps may not have been identified when a short-term solution is put into place.

The design led framework proposes radical innovation as requiring full engagement of the *entire* business model; the nature of this may be confronting in the scale of risk. Commonly, firms including family owned businesses experience considerable apprehension towards prototyping on a business model level as oppose to a product concept level is because feel a lack of control over the intellectual property or an inability to manage expectations in the market (Bucolo and Wrigley, 2012). As discussed throughout this literature review however, firms competing in the current economic environment cannot risk continuing along the same levers of growth they have always relied on. Often firms continue to concentrate only on the most immediate point of a product or service interaction/transaction as the key opportunity for innovation. As a result, they bypass a much more enriched understanding of their product or service as *one event* in a series of customer interactions with other stakeholders, products, services or emotions.

Design led innovation helps firms by using design thinking to find untapped market opportunities to remain competitive within an increasingly crowded marketplace. Critical assessment of the business model through design led innovation is fundamental in sustaining growth by aligning strategic vision, operational fluency and most importantly the customer.

4.6 Design integrated company

As discussed, design led innovation exists as a framework where design thinking is a core activity of firm's systems and workflows when seeking top tier growth. Such firms are described by Bucolo and Wrigley (2012), as *'design integrated firms'. Design integration,* is defined by Bucolo (2012), as having a vision for growth in a business based around deep customer

insights. Expanding this vision with customers and stakeholders and then mapping these insights to all aspects of the business.

It is recognised by a number of scholars that successful, truly innovative firms or design-integrated firms infuse design thinking as a central capability, which pervades all aspects of the business (Dorst, 2011; Brown and Wyatt, 2010; Martin, 2010). Firms that innovate well have a ‘core value system’ that measures and aligns such behaviours so they are manifested on a daily basis (Ward et al. 2009). Design integrated firms are defined as having the following capabilities (QMI Solutions, 2012):

1. The entire product/service life cycle is led by design - from research and development and branding, through to distribution and customer support.
2. They predict, understand, respect and creatively respond to customers' needs.
3. Products and services are markedly different from the competition - there is a point of difference.
4. Intellectual Property (IP) provides a rich asset to their business - they are IP aware and aggressively develop new IP.
5. Export focus is a key driver - they are internationally competitive as market leaders.
6. Quality and consistency are paramount.
7. Style and functionality share equal importance.

The case study presented within this research examines the challenges a family owned manufacturing firm may face when trying to implement a design led approach towards innovation. Transformation to design integration is profoundly complex and cannot be treated as a discreet event or as a project in isolation. Factors discussed throughout the literature review on family owned firms and manufacturing SME’s such as family culture, tendency to keep strategic visions close and a preference to outsource strategic design work all effect the degree to which these firms can wholly embrace design led innovation.

4.7 Summary

This chapter documented design led innovation and its application into a business environment. As discussed by Bucolo and Matthews (2010), for radical innovation to be discovered, design led innovation proposes that both sides of the organisation, operational and strategic need to be simultaneously prototyped in the business model proposition. Furthermore, that customer insight should extend to all facets of the business rather than only into product centred value. This means that organisations need to be proficient in internalising cues from the external stakeholders of the company to begin to develop a customer facing culture.

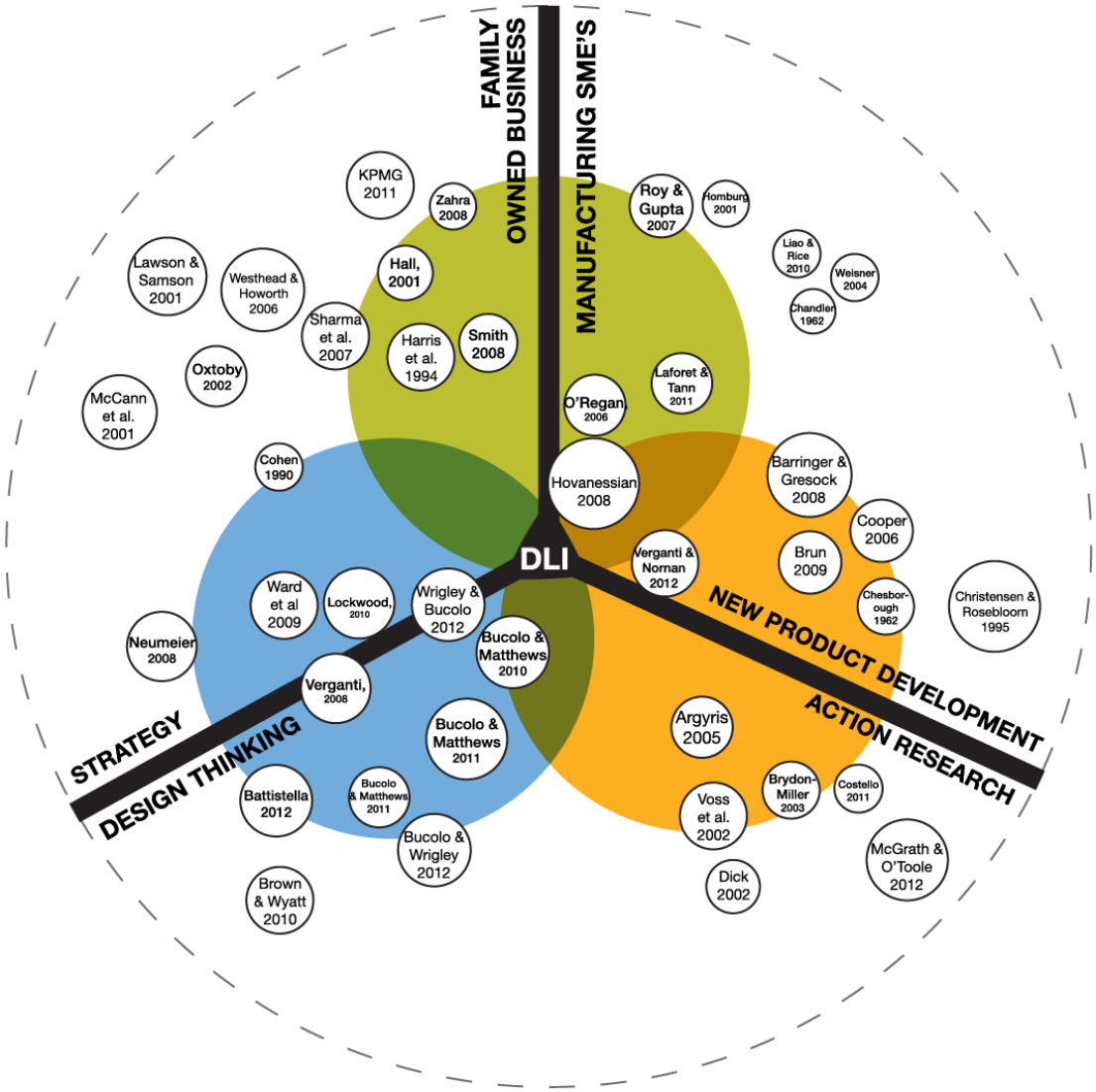
As the focus of this research is on the application and integration of a design led approach in a family owned SME, the idea that organisations need to be responsive to market change in order to sustain a design led approach is important. It is hypothesised that there could be some conflicting barriers to integration because the research on family on SME's indicates that these types of organisations can take on a very sentimental affiliation with the incumbent business model, processes and culture. Financial frugality can become characteristic of succession planning and the centralisation of power can limit the opportunity for new idea dissemination. As the firm's core capability lays in manufacturing, the opportunity for a design led approach to find traction in new product development processes could be opportunistic. However this relies on key management stakeholders endorsing a fundamentally different mode of thinking (design thinking) which could challenge the continuity of business efficiencies.

Chapter 5: Literature gap

5.1 Identified gaps

There are gaps in the availability of action led research within family owned SME's examining the acceptance and integration of design led innovation into firms (Matthews and Bucolo, 2011). More specifically, the barriers that may restrict the firm transitioning from incremental innovation to radical innovation. As the research question proposes, without greater understanding of the role organisational culture plays in harnessing or limiting a design led approach, existing methodologies, frameworks and tools are all but mere surface solutions because they will not be driven over a long period of time.

Figure 16 below graphically represents a sample of the literature discussed in regards to knowledge contribution in particular fields. While there is extensive research to date regarding innovation, organisational structures, change management and cultural barriers within both family owned business and SME's, there is limited action research addressing the application of new ideologies or frameworks. Approaches such as design led innovation remain largely un-explored in the context of family owned SME's that are not traditionally design orientated. How such businesses overcome their incumbent modes of thinking and behaviour to incorporate design central to the organisation is unknown. As Figure 16 indicates there is good coverage on the fields of family owned business as a topic in itself but gaps in the availability of information on the effects of design thinking on family owned business strategy. A secondary gap exists between the literature on action research approaches and design thinking. Here there is opportunity to add to the knowledge base regarding action research's effectiveness in engaging a family owned firm in a design led approach.



Argyris, C. (2005).
Barringer, B. B., & Gresock, A. R. (2008).
Battistella, C., G. Biotto, et al. (2012).
Brown, T., & Wyatt, J. (2010).
Brun, E., Saetre, A. S., & Gjelsvik, M. (2009).
Brydon-Miller, M., D. Greenwood, et al. (2003).
Bucolo, S. and J. Matthews (2011).
Bucolo, S. and J. Matthews (2010).
Bucolo, ; Wrigley, C. (2012).
Chandler, A. D. (1962).
Chesbrough, H. (2007).
Christensen, M. C. (1997).
Christensen, & Rosenbloom. (1995).
Cohen, W. M. and D. A. Levinthal (1990).
Cooper, R.G. (2006),
Costello, P. J. M. (2011).
Dana, L. E. and K. X. Smyrnios (2010).
Dick, B. (2002).
Family Business Australia; KPMG. (2011).
Fraser, H. M. A. (2007).
Hall, A., L. Melin, et al. (2001).
Harris, D., Martinez, J. I., & Ward, J. L. (1994).
Homburg, C. and B. Rudolph (2001).
Hovanessian, N. (2008).
Laforet, S. and J. Tann (2006).
Lawson, B., & Samson, D. (2001).
Lockwood, T. (2010).
Liao, T.-S. and J. Rice (2010).
Manufacturing Australia (2012).
Matthews, J. and S. Bucolo (2011)
McCann, J., Leon-guerrero, A. & Haley, J.(2001)
McGrath, H., & O'Toole, T. (2012).
Neumeier, M. (2008).
Norman, D. (2009)
OECD (2009)
O'Regan, N., G. Abby, et al. (2006).
Oxtoby, B., T. McGuiness, et al. (2002).
Roy, A. and R. K. Gupta (2007).
Sharma, P., Chrisman, J. J., & Chua, J. H. (1997).
Smith, M. (2008).
Verganti, R. and D. A. Norman (2012).
Verganti, R. (2008).
Voss, C., Tsikriktsis, N., & Frohlich, M. (2002)
Ward, A., Runcie, E., & Morris, L. (2009).
Westhead, P., & Howorth, C. (2006).
Wiesner, R., H. C. Banham, et al. (2004).
Wrigley, C., & Bucolo, S. (2012).

Figure 16 – Literature gap schematic (adapted from Wrigley, 2011)

In summary, the major gaps in the literature identified:

- Further investigation is required regarding the process of integrating design led innovation into business.
- There is limited research identifying specific barriers that can arise in the implementation of the design led innovation framework in relation to a family owned SME.
- More information is required to formulate strategies targeted at successfully helping family owned businesses to utilise design as a central capability towards radical innovation.

This research study within a family owned manufacturing SME can draw some transferable key ideas or strategies that could be valuable in assessing the applicability of design led innovation in to family owned business. A case study approach (which will be detailed in the following chapter) is highly appropriate as it is expected that every firm is different, with varying structures, cultures, management and goals. Consequently, they will encounter different challenges in implementing a design led approach. So, by targeting this gap in the research through immersion within a family owned manufacturing SME, the researcher aims to create some structured processes upon which the theoretical base of design led innovation can be better understood (Chetty, 1996).

5.2 Summary of Literature review

In summary, the key areas of literature that have been examined within this research surrounds family owned business, new product development within manufacturing SME's and design led innovation theoretical frameworks.

Literature on family owned SME's discussed the challenges (and advantages) that family owned business face in managing growth,

stewardship and the preservation of company values as well as the dissemination of new knowledge and learning. The value of family owned business to Australia's long-term economic health is vast and the opportunity to help these businesses to innovate over their often larger, publically owned counterparts is threefold. Family owned businesses demonstrate greater attention to detail in financial frugality thus strengthening firm sustainability. Stewardship managed correctly can encourage emotional investment in maintaining organisational stability of the firm in the long-term. Lastly, the absence of complex bureaucratic structures and processes can, in some instances, be environments conducive to harnessing change and facilitating new ways of thinking.

Design's role in new product development is also important when framing the research as it gives context to how valuable design activities are within a within a manufacturing environment. Of particular importance is the need to cultivate design strategy as an internal activity rather than outsourcing project work in the early stages of brief development. The benefits of internalising the crux of thinking, conceptualising and prototyping enables SME's to purposefully question and align all new product development with the greater firm values and growth goals.

Although, literature also outlined SME's preference to seek innovation opportunity from an outside-in approach where they will often rely on external knowledge to drive internal action. A gap in knowledge however, is how family owned business internalise new information and drive meaningful change throughout the organisation.

Lastly, design led innovation and other proponents of design innovation literature including design drive innovation and design thinking was discussed. The need for firms to invest in finding new markets, products and processes to radically innovate will require a change in the way design is perceived and utilised throughout the business. This research thesis aims to

unpack the perceptions and responses of one such firm when trying to instil a design led culture. Building upon the design led innovation framework, the study seeks to specifically examine its application into a firm and the barriers that inhibit design integration.

Chapter 6: Case study background

6.1 Introduction

It is important to outline the context of the research by documenting the background of the case firm. Due to some information about the case firm being commercial in confidence and bound by ethical agreements, some details cannot be discussed. This chapter will however, outline the market and value chain in which the firm operates, the family structure, the history that lead a university/industry based to engagement and the some insight into some current design processes.

This chapter also attempts to provide the reader with an understanding of how the design led innovation philosophy was applied under the researcher's scope of responsibility. Three dimensions are discussed including product, process and meaning. These dimensions are not part of the methodology but an implicit tactic utilised by the researcher in an attempt to communicate to key stakeholders the range of influence and impact of the design led approach.

6.2 History

The case firm is an Australian steel fabricating company of a few hundred employees who design and manufacture for the industrial and construction markets. With a long-standing presence in the industry, the family owned business has experienced continual growth. The firm has a strong market share of the Australian sector however also has intentions to expand its presence on the international market.

Third generation family members are involved in the day-to-day running of the firm throughout a number of managerial positions. The firm also has a high tenure of non-family members who have been employed by the firm for

up to 30 years, whom often hold influential positions. As a result, a wealth of knowledge exists, not only about the industry in which the firm operates but also the historical past which grounds the firm with such a strong cultural identity.

6.2.1 Innovation capability

Most certainly the firm has successfully embarked on change initiatives in the past to sustain its considerable growth. These range from implementation of various projects including technology and equipment upgrades, digital sales communication tools and site expansion. In general, these projects have been incremental improvements with the aim of streamlining processes, aiding communicative transparency and increasing production capacity. As previously discussed, incremental innovations typically improve performance of existing products along the dimensions that mainstream customer's value (Verganti and Norman, 2012). Predominantly reactive, these changes have advanced the company but not at the pace required to combat strong international competition and more importantly, not at the level to increase customer market share. With measurable and foreseeable outcomes that compliment a risk avoidance nature, these projects have allowed the firm to comfortably sustain a place growing with the market but not leading the market.

An established relationship with the university occurred prior to the researcher being embedded within the firm. The contact was through a government led initiative for manufacturing SME's, which was developed to help mainstream businesses become internationally competitive through design. University representatives and industry professionals from both business and design worked with the firm in assessing organisational gaps or opportunities through an innovation audit. One of the key recommendations for the case firm was to embark on re-branding the organisation in an effort to re-align the core values, growth aspirations and activities.

Following this audit, the firm engaged with a third party brand and marketing consultancy to undertake a brand over-haul. Still, the organisation recognised the need for a more permanent position of a DLI catalyst. This lead to the proposition for an embedded masters student to further develop the firm's ability to transform to a design led company.

As a manufacturing SME, value is placed on the production and design of product. Consequently, innovation has, in the past predominantly centred on product or tangible offerings of the firm. Of more recent times the firm has begun to explore service based offerings to compliment the product in areas such as quoting and ordering. Still, the firm operates under a vision where the core activity is the supply of industrial goods. Naturally this requires greater examination of the firm's current new product development activity where there is ripe opportunity to utilise design thinking.

6.2.2 New product development

As the firm is family owned, the unique structure and culture plays a significant role in how the firm is strategically orientated and the activities that drive everyday operations. Typically, the firm has exercised design as a departmental function within the value chain responding to the customisations and specifications of orders. A strong entrenched perception of design as an *'add on'* function further down the production channel means that there can be disconnection between managerial decisions and design influence.

As a result, high volumes of projects are managed simultaneously in isolated instances across the firm. The firm has typically utilised a *Stage Gate* model as discussed in Chapter 3 to find incremental innovation in new product development (NPD).

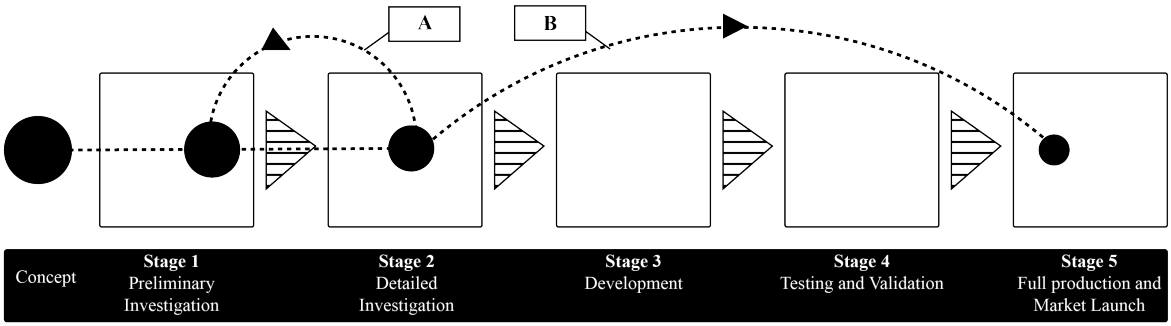


Figure 17 - Stage Gate project flow observed within case firm

Often lead by the competitor market more than the customer, projects at the case firm entering the first gate can risk a cyclical rotation between first and second gate because the brief is not driven through subsequent gates by core value propositions and constraints. Consequently more time is spent finding the solution rather than better defining the problem to give clarity to the solution. Figure 17 above shows how the Stage Gate model is utilised within the case firm. Sequence 'A' shows the recurring tendency of projects to move between first and second gate usually due to an inclination to re-fit the brief to the path of least resistance. Sequence 'B' can then occur where the need to have something in the market space causes the bypassing of critical gates.

A number of reasons exist for projects circulating the *Stage Gate* model but a summary is supplied by a participant of the research: *"relying on adaptations of existing solutions, allowing clients to dominate new specifications and falling back on core manufacturing competencies so often."*

A key challenge facing the firm is adjusting the structure and workflows to enable better allocation of resources towards defining whom the customer is and what their problems truly are. As a fundamental and central competency of the design led innovation approach, prototyping more consistently throughout the design process is recognised by the firm as a key area for change. The repercussion of not prioritising prototyping is that the value

proposition is tested predominantly through the fully materialised product in the market. Incurring added cost, time and risk to the firm's brand. A standout characteristic used to describe the firm in light of the aforementioned behaviour was "fault tolerant". One participant discussed that the case firm was receptive to "killing a project at the 11th hour" through being realistic about the availability of profitable market space. There was consensus that decisions like this are made because of a gap in the case firm's ability to effectively 'predict returns on innovative concepts' in the *early* stages of project conception.

One of the greatest inhibitors for firms seeking radical innovation is being able to predict returns on innovative projects. Design led innovation as a process is about mitigating that risk and unpacking the problem closely with the customer in the early phases of a project to ensure there is real value at the conclusion of a project. Consequently, the NPD process in which the case firm currently operates reveals opportunity to develop some processes which will better define the brief and give clarity to the solution.

6.2.3 Industry placement

To frame the context in which the firm operates, this section will briefly outline the position of the case firm in the industry value chain. This is important to examine as the distinction between product-based organisations and services continues to blur and shift focus to integrated solutions. Hence, understanding whom the critical stakeholders is fundamental to the case firm achieving a design led approach. Below, Figure 18 shows a basic structure of the typical value chain in which the case firm operates.

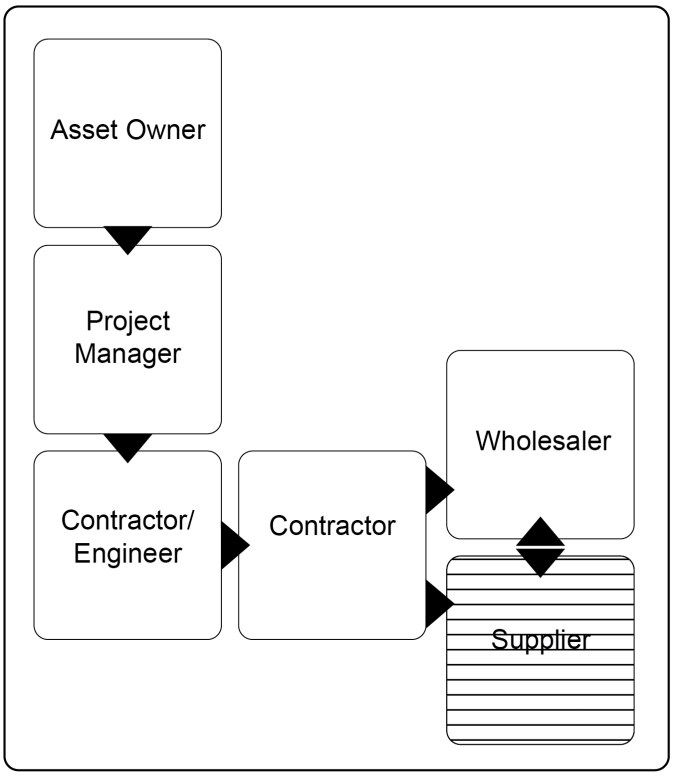


Figure 18 - Value chain representation (case firm position indicated with shaded box).

Indicated by the shaded box, the case firm (as a supplier) is situated at one of the most distanced positions from the end user or asset owner. This means that while the firm's product needs to provide product-centric value to the end user it also needs to appeal through service-centric elements to a number of intermediary customers in between.

An affiliation with wholesalers leverages selling capacity but also adds an agent between the supplier and the influencers of the purchase decision. Consequently, establishing close customer relationships with higher levels of the value chain are also important to sustain large-scale project work.

Australia's small and dispersed markets and remoteness from larger markets, means that there is often disconnect between those higher in the value chain with those lower. As project deadlines become shorter to cope with

Australia's resource growth schedule as well as other industrial projects, the challenge becomes about maintaining communication and knowledge across the value chain. In a highly competitive industry, manufacturing firms need to recognise the need to move beyond a dominant product focus where the buyer is not passive but active and the process is no longer transactional but relationship specific (Homburg and Rudolph, 2001).

As the firm is positioned on the lower end of the value chain as suppliers, this reinforces the firm's dominant activity of product manufacture and product centred innovation. While product is an important asset to create innovation, the firm will be challenged to see the opportunity for radical innovation as more than just product. This will be another primary consideration in the investigation because while it is equally important to maintain focus on product; the successful integration of design led innovation will require a shift in the firm's mentality to see value in other innovation opportunities beyond product alone. The following section further explains the importance of seeing beyond product centric innovation and how the design catalyst promoted holistic design thinking.

6.3 Importance of product, process *and* meaning

To illustrate the scope and language of the researcher's engagement within the firm – three dimensions of conversation are used: product, process and meaning. For the sake of this explanation they will be referred to as 'lens'. For example, looking through the 'product' lens at a problem will undoubtedly reveal different information than if one were looking through the 'process' lens at the same problem.

These three dimensions help to demonstrate the scope of innovation and the importance in maintaining focus on 'the bigger picture' beyond just product. As Figure 19 indicates, such a conversation should not be static but a fluid process wherein all three lenses are concurrently viewed in context of one

another. Figure 20 outlines the types of questions that the researcher may ask when viewing the problem through each lens.

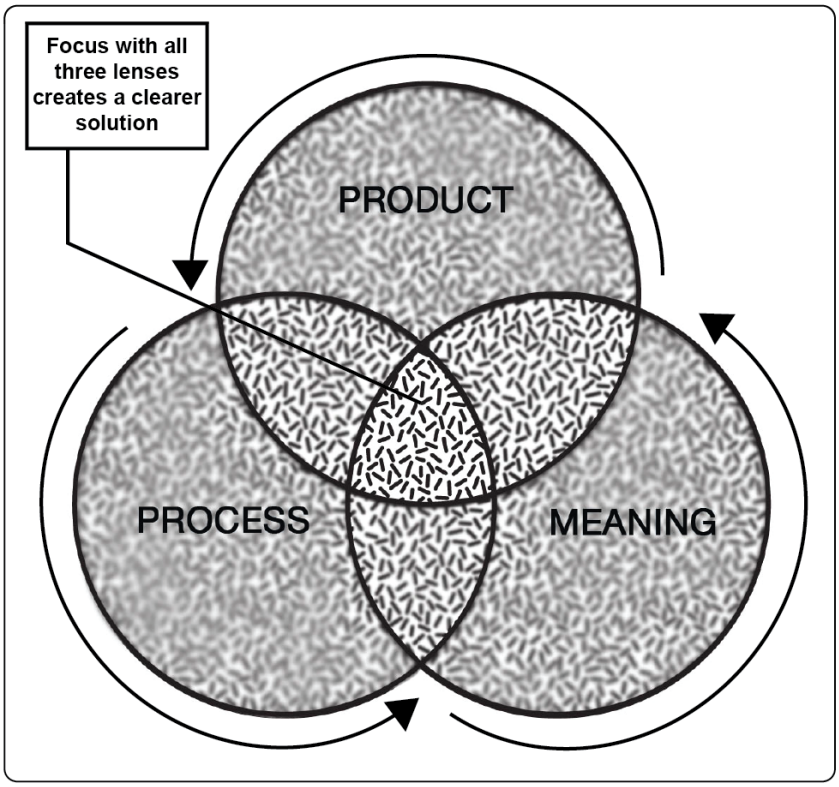


Figure 19 – Integration of product, process and meaning – clarity found through converging of lenses.

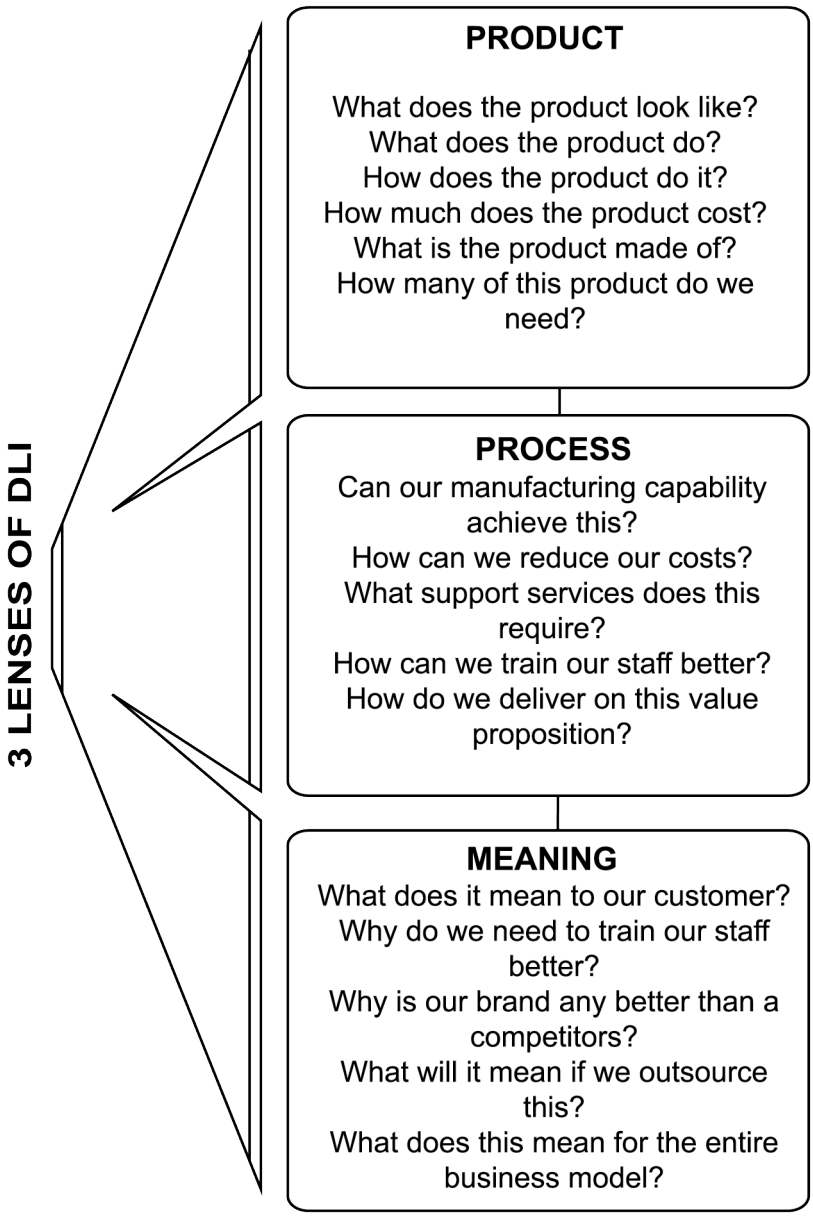


Figure 20 – Description of product, process and meaning – types of questions asked through each lens.

As previously mentioned, the case firm focuses a lot of innovation activity on product related outcomes. While process related activities are prioritised in terms of efficiencies of production and streamlining of workflows, they aren't really perceived as opportunity for innovation.

The ‘process’ lens is focussed on the surrounding operational activities required to complete a product offering. Viewing through this lens should see the product in the context of the logistics of the business model – the required resources, capabilities, skills, tools and capacity of the firm. Simultaneously seeing through product *and* process lens should give focus on things such as: how the product can be designed more effectively to maximise existing manufacturing capabilities; reduce costs; design for usability in packaging and distribution of goods to the customer. What this does *not* answer however is ‘*why* this is done this way? Furthermore, what does this *mean* for the customer and the business model?’ This is where meaning is important to contextualise in any prototyping scenario.

The meaning lens is therefore perhaps the most important lens of all in driving radical innovation. Here, focus should be on the meaning behind both process and product related decisions and effectively questioning how doing things in such a way will add *meaningful value* to the customer. But of course, there is no point in understanding the meaningful value to the customer if it does not equate to meaningful value for the business through the successful execution of product and process related activities. Therefore, by simultaneously focussing on all three – a holistic perspective can be gained where the identified customer value is equalised across all facets of the business model.

6.4 Summary

This chapter presented background on the case study firm in which the research is being undertaken. The firm’s history, propensity to innovate and its new product development processes were outlined. Finally because the firm place a lot of emphasis on product orientated innovation and growth, three dimensions were presented: product, process and meaning. These were used to illustrate the scale of opportunity for the case firm.

Furthermore, the importance for the design led approach to transcend a multitude of intangible and tangible assets of the firm.

Chapter 7: Research Design and Methodology

7.1 Introduction

The following chapter outlines the research methodology used in the investigation. The objectives of this embedded research are:

- To understand the key challenges and barriers of practical application of design led innovation within a family owned SME.
- To identify the subsequent opportunities for change to enable integration of design led innovation into a family owned SME.

Figure 21 below provides an overview of the structure of the research design. The epistemological stance taken within this methodology is 'constructivism' – which emphasises "instrumental and practical function of theory construction" (Crotty, 1998). An inductive research approach compliments the qualitative nature of the case study because the researcher will be embedded in the firm in an action research method. In this case, the researcher will be observing the behaviour and responses of the case firm when trying to integrate a design led approach. Three key methods of data capture were employed including a reflective journal, 25 qualitative interviews and a focus group. The data captured through these methods were thematically analysed for recurring patterns, which identified barriers that restrict the firm from engaging in design led innovation.

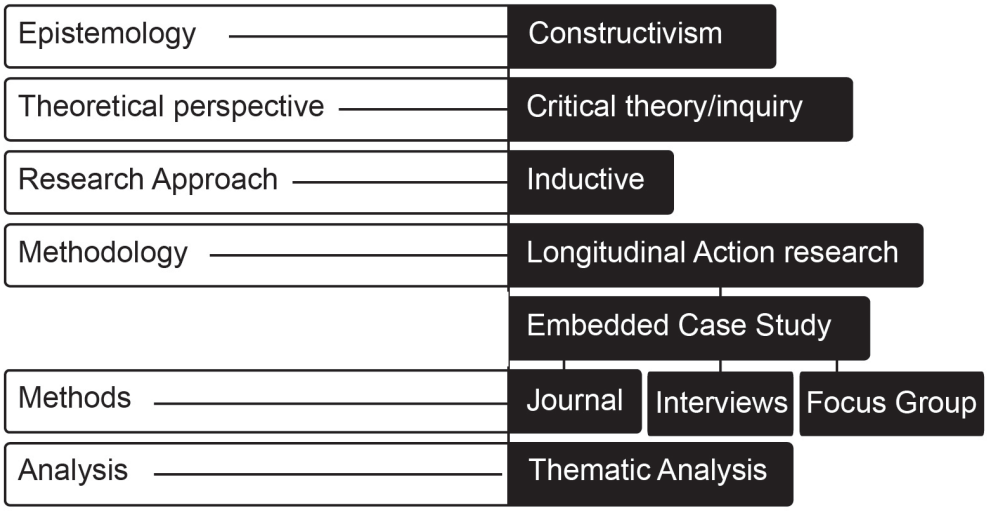


Figure 21 - Methodology framework and background

7.2 Research Approach

Ultimately this embedded research case study aims to identify opportunities for the firm to utilise a design led approach to better understand their customers, create competitive value propositions and design radical innovation. Encouraging design thinking as a pervading source of creativity, innovativeness and efficiency in all activities will be key to gaining traction in the transformation process. This is particularly important, as a key objective of the research is to see how different approaches elicit barriers or open doors to innovate.

Multiple authors cite action research as being appropriate to meet such outcomes as it is “designed to improve the researched subjects’ capacity to solve problems, develop skills (including professional skills), increase their chances of self-determination, and to have more influence on the functioning and decision making of organisations and institutions from the context in which they act.” (Elden and Chrisholm, 1993, p.125; Mcgrath and O’Toole, 2012; Brydon-Miller et al. 2003).

Secondly, an action research approach over an extended period of time allows the participating business to develop a trusting, non-biased relationship with the design catalyst through the co-exposure of the internal culture, processes and activities (Costello, 2011; Byrdon-Miller et al., 2003). Participant exposure and engagement is a critical factor in better understanding the rooted causes for behaviour in this particular case study. This is supported by Brydon-Miller et al, (2003) who understands action research as critical in providing legitimacy to a theoretical founding. Literature adds to this by noting that action research is different because the aim is not solely about collecting data. Rather, the research/er could be involved in making change or helping systems/workplaces to 'develop a higher degree of self-determination and self-development capability so that learning continues after the researcher leaves the system' (Elden and Chisholm, 1993).

7.3 Methods:

Three key methods of data capture were utilised throughout the design research methodology. These included journal entries, interviews and a focus group. Figure 22 and the subsequent table provide a longitudinal representation of when these events occurred and the types of analysis used.

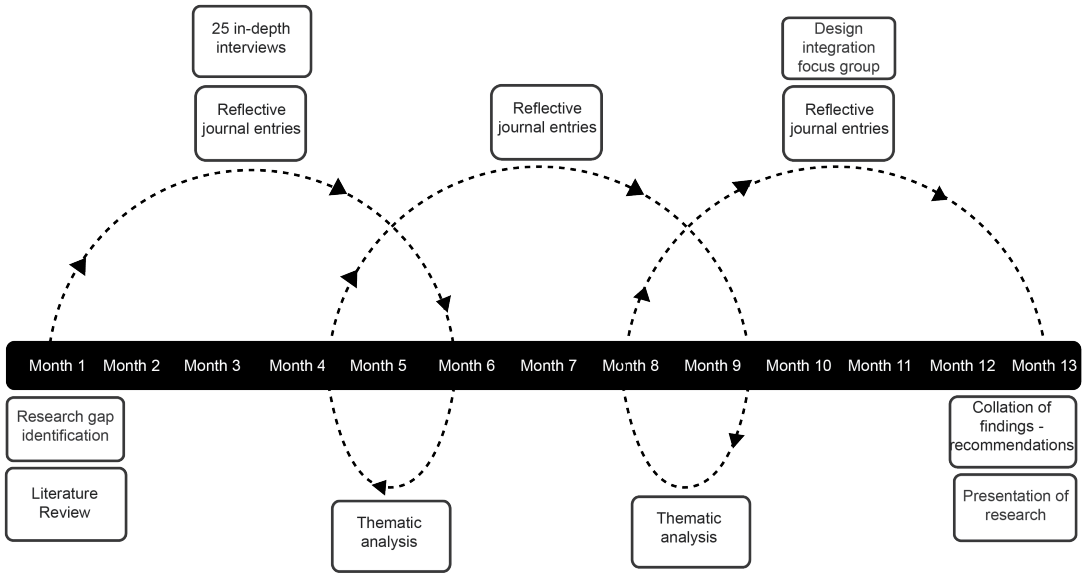


Figure 22 - Longitudinal representation of methodology

	Interviews	Focus Group	Reflective Journal
Time/ Duration	• 3rd month of engagement. • Interview duration: 30mins-60mins.	• 10th month of engagement. • Focus group duration: 60mins. • Loosely structured discussion	• 12 months • As events occurred throughout yearlong duration
Key Objectives	• To understand how innovation and change was perceived from within the company prior to no exposure to design led innovation. • To understand existing change or innovation ventures of the firm.	• To understand the group's assessment of their own ability to integrate and influence a design led approach within their current roles following exposure to various design led initiatives.	• To monitor less explicit, behavioural responses • To add contextual evidence to other data captured • To keep a tracking log of events, changes, challenges etc.
Questions/ Method	• Audio recorded and transcribed for thematic analysis.	• Researcher lead discussion topics including: balancing between core responsibilities and new initiatives; previous initiative's failings; how to achieve buy in and cultural change. • Audio recorded and transcribed for thematic analysis.	• Short commentary description typed in Word documenting specific events as they occurred.
Participants	• 25 participants ranging from parts of the business including: design, marketing, management, finance, business development, sales.	• 7 participants ranging from parts of the business including: marketing, design, management and business development.	• No specific participant group rather general observations of internal activities and experiences relating to those observations.

7.3.1 Reflective Journal

A key data collection method within the embedded, action research was a reflective journal, which enabled the opportunity to observe the less explicit responses and behaviours from participants (Voss et al. 2002). Often cited as a compulsory method of data collection by action research authorities, the reflective journal enabled the recording of patterns, impressions and ideas before, during and after formal analysis (Voss et al. 2002, Elden and Chisholm, 1993; Costello, 2001). The journal documented impressions of particular internal events as they occurred, these included if a barrier to implementation had arisen; challenges in achieving consensus amongst a group or general observations of firm operations. These contributed to a final thematic analysis and gave environmental context to the identified themes derived from other data capture methods.

7.3.2 Interviews

A set of in-depth semi-structured interviews with 25 participants (from within the firm) were conducted at the 3-month stage with chosen participants from various departments including marketing, human resources, finance, information technology, procurement, planning, manufacture, design and leadership. As the first research technique, the interview drew upon knowledge learnt from the relevant literature and aimed to understand how innovation and change was perceived from within the company prior to any knowledge or contact with the design led innovation process. Furthermore, as they were conducted in the early phases of the engagement, the interviews were also adding to the 'immersion' phase of the contact; understanding firm operations, culture, history and values. Questions surrounded the participant's perception of:

- Their role and challenges in day-to-day activities of firm
- Case firm's core activities and brand values

- Importance of communication
- The firm's ability to innovate and current level of innovation initiatives
- Researcher's engagement and potential to influence change
- The importance of design towards innovation
- Specific challenges the firm may face in embarking on change

The participants were approached and recruited through personally addressed emails upon which they will were able to give informal agreement or disagreement to participate. The interviews were audio-recorded and transcribed for thematic analysis purposes.

7.3.3 Focus Group

The final data collection method occurred the 10th month of the engagement wherein 7 participants from marketing, design, business development and management were asked to join a loosely structured roundtable discussion. The focus group was for the duration of 60 minutes. The researcher conducted a preliminary research technique in the form of short answer questionnaires, which asked the participants various questions about their perceived ability to influence change and what their first strategic decision would be in beginning a design led approach. These answers were then collated and anonymously presented at the beginning of the focus group to give the participants a collective, non-judgemental understanding of each other's views.

Following this, detailed discussion progressed surrounding key topics including:

- The group's perceived ability to integrate and influence a design led approach within current roles.
- Perceptions of why previous initiatives may have failed

- How to best balance core responsibilities of daily activities with new initiatives
- How buy-in and cultural change can occur within the case firm.

7.4 Analysis

The method used for analysis of the collected data has been through thematic analysis which is exemplified by Appendix A and Appendix B. Utilising thematic analysis has been important as the research approach is inductive and has been built upon observational data to determine re-occurring themes in the data. Furthermore, using thematic analysis does not pre-determine the specific nature of the emergent themes to be explored (Ezzy, 2002). Figure 23 shows the process for thematic analysis of the data content:

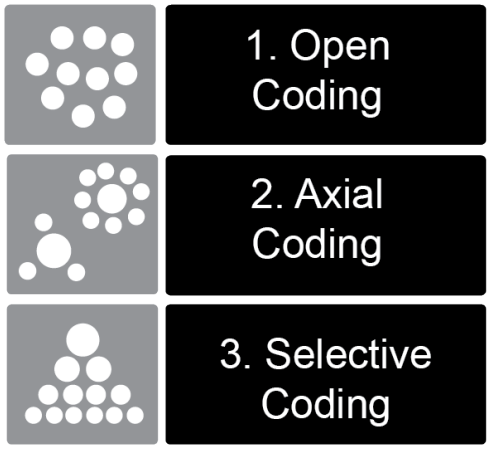


Figure 23 - Stages of thematic analysis coding

The first step is to conduct 'open coding' which is described as 'the part of the analysis that pertains specifically to the naming and categorising of phenomena through close examination of data.' (Ezzy, 2002, p.88). In other words, the data is filtered and compared for patterns and consistencies, which can emerge into some overarching themes or insights into the data's meaning.

The next step is defined as ‘axial coding’ which involves, ‘specifying a category (phenomenon) in terms of the conditions that give rise to it; the context (it’s properties) in which it is embedded; the action/interactional strategies by which it is handled, managed, carried out; and the consequences of those strategies’ (Ezzy, 2002, p. 91). Here the objective is to critically examine the established themes through 4 key lenses: context, strategy, processes and consequences thus validating the theme’s original identification as part of the analytic ‘whole’.

Lastly, ‘selective coding’ involves the identification of the core category or story around which the analysis focuses. The themes are repeatedly verified or revised and placed into a hierarchical structure wherein the source or dominant theme forms the basis of the research findings.

According to Ezzy (2002), when coding the data in the early stages of data analysis, information can present as confusing - with large amounts of what may appear to be unrelated material. As the coding progresses however, varying themes become more evident with greater clarity surrounding the deeper insights and meanings behind each of those. Using such a process allows the researcher to move beyond existing theory to hear new interpretations and perspectives of the data (Ezzy, 2002).

7.5 Limitations and strengths of action research

Using an action research approach enabled the possibility to ‘embed learning into practice’ A method often used in business application research, action research can “engage problems that require significant change in organisations but also at an individual, “mindset” level (McGrath and O’Toole, 2012, p.1). This is particularly valid to this research because the successful integration of a design led approach relies on the ‘cultural mindset’ being able to shift and embrace new learning.

Traditionally action research methods were perceived to be only appropriate for exploratory research because they fail in providing a basis for scientific generalisation. (Chetty, 1996). This is because conventional science aims to produce new knowledge by solving scientific problems, whereas action research solves *practical* problems to create new general knowledge (Elden and Chisholm, 1993). In support, Yin (1989, p.35) suggests: "…case studies, like experiments, are generalisable to theoretical propositions and not to populations or universes." Case studies are not representative of a sample and so should not be seen as definitively drawing conclusions applicable to a broader segment.

Furthermore, action research is often highly participatory where the people/research subjects who are experiencing the 'problem' are necessary to help make decisions about the research strategy. This could be seen as a limitation in that the researcher risks bias and a skewed model of engagement (Elden and Chisholm, 1993; Brydon-Miller et al, 2003). From a research design perspective however, this method is deemed as highly necessary if the research is about understanding the barriers and behavioural responses of a firm when trying to implement a design led approach. In this case, it is fundamentally the participant's involvement that can orchestrate change and provide a true representation of behaviour.

Chris Argyris' (1995) work on action research discusses the importance of maintaining awareness of participant's behaviour throughout an action research investigation. Argyris (1995) notes that research in organisational environments that are about promoting change and challenging participants to engage in a new approach need to be carefully navigated. His research suggests that there is two key behavioural responses participants can express when presented with a researcher's proposition. Instinctive behaviour elicits a 'bypass and cover-up' response to any concept that is likely to cause them embarrassment of 'loss of face'. Participants on both an individual and organisational level can demonstrate this. These behavioural

responses are called ‘defensive routines’ and are defined as *“any action, policy, or practice that prevents organisational participants from experiencing embarrassment or threat and, at the same time, prevents them from discovering the causes of the embarrassment or threat”* (Argyris, 1995, p21). These strategies acted out by individuals, reinforce defensive routines in the organisation and vice-versa; meaning that it is not possible to change organisational routines without altering individual routines.

This idea supports McGrath and O’Toole’s (2012) research of action-orientated approaches in SME’s. More specifically it aligns to what they define as “Emancipatory Action Research”. In an emancipatory action approach, the researcher helps participants to see the problem more clearly in their own specific settings in order to resolve them. But it also aims to assist participants to recognise how their own personal beliefs and values are manifested within the organisational culture and how that may impact the problem.

Both of these theories are relevant to the study at hand as they closely document the culture of a business as being defining of the individual and organisation’s behaviour towards change. The justification of action research as a valid method of theory building is well articulated and supports the research objectives in this investigation.

7.6 Ethical considerations

Ethical considerations are an important element to the research design as it involved the active engagement and immersion in to the activities of participants. In order to meet Queensland University of Technology’s (QUT) requirements and to commence research, a low risk ethical approval form was submitted. As a result, the University Research Ethics Committee of the Queensland University of Technology granted ethical clearance for the continuation of the research. All interview participants were also asked to sign a consent form prior to the interview. (Appendix C)

7.8 Summary

This chapter has outlined the research design for the investigation. In addition to the research being conducted in an action research method, three key methods of formal data were used to strengthen the research validity and to further develop an understanding of the participant's perspective. These included a reflective journal, a focus group and 25 qualitative interviews. This assisted in further developing the theory of design led innovation and its application into a family owned SME. Thematic analysis of all three data sets was conducted to identify re-occurring themes that were identified as barriers to engagement of the design led approach.

Key considerations of an action research approach were also briefly outlined including the need to pay particular attention to the learning methods of individuals within the firm. The researcher needs to be aware of how their presence disrupts the incumbent activities, values and culture. Furthermore, as the research is within an SME environment, which are described as 'doers', the challenge for the researcher will be empowering participants to address strategic issues beyond the day-to-day (McGrath and O'Toole, 2012).

Chapter 8: Results

8.1 Introduction

This chapter presents the results of the analysis from three formal modes of data collection, including a reflective journal, which was kept throughout the 12-month engagement, 25 in-depth, semi-structured qualitative interviews and a focus group. These were documented in detail in the previous chapter. These results can be viewed as response to the first part of the research question which is: *how can organisational barriers be overcome through an action research approach to increase a family owned SME's ability to implement change and sustain a design led approach?* Therefore, the objective in this chapter is to identify what those organisational barriers actually are. This will then set the context for the following chapter on the opportunities for the firm to bring down those barriers and engage with design led innovation.

The results will be presented using direct quotes from participant transcripts to further emphasise and exemplify the observations. Appendix A and Appendix B show how the quotes have been categorised from the individual data sets and then collated to find the core themes.

It is important to note the while direct quotes only will be used in this chapter; the observations were derived through the salience of themes in transcripts but also through the key events that framed each method of data collection. These key events were recorded in the reflective journal kept by the researcher and have helped to further rationalise the results in key observations. So, the direct quotes used here have been identified as being the most effective to illustrate the results that have emerged from all three methods of data collection. Up to 32 different participants were involved in the formal data capture of the focus group and qualitative interviews, while

another broader sample of participants and their behaviour were observed contributing to the identification of the following key observations.

The table below outlines the key observations of the thematic analysis. They are also ranked according to the salience of the observation in the data. Following the table, the key observations will be discussed individually.

Observations	Description	Analysis Cues
Vision from the top to drive growth	The importance of marrying the company's vision for the future with the priorities and activities of new product development. Furthermore, the importance of family leadership presence in guiding new visions and innovation.	Any notion that refers to the firm's need for stronger company vision and communication of growth strategy. Furthermore, any notion that refers to the importance of family leadership in driving change.
Solving problems individually	The culturally pervading effects of an individualist approach to strategic and process orientated activities within the firm.	Any notion that refers to the individual pursuit of projects and activities. Also the personality driven impacts that negatively or positively gear the firm for innovation.
Involving and leveraging people	The opportunity to engage those with less tenure in the firm to harness new thinking and perspective towards problems.	Any notion that refers to the opportunity for employees including those lower in hierarchy to contribute more knowledge and experience in order to enhance the firm's ability to innovate and activate change.
Customer relationship building	The challenges in building a partnership with customers that creates an open source of insight and strategic direction. Furthermore, finding value in engaging in conversations outside of product centric issues.	Any notion that refers to the firm's apprehensiveness in approaching the customer with greater intimacy. Also references to the strategy surrounding such conversations and dialogue with the customer.

8.2 Vision from family leadership to drive change

A major theme drawn from the data was the importance of vision and clarity of the growth strategy to be communicated and driven from the family. This

was identified as a key area for consideration in enabling the researcher to gain traction with the design led approach. It was also most notably communicated at the beginning of the engagement but was validated through the observations made in the reflective journal throughout the year.

Vision refers to not only the firm's future plans but to other culturally pervading ideas such as employee's perceptions of the core product offering and its potential for innovation. The results revealed that the active presence of leadership within a family owned firm plays a fundamental role in both instigating change in the day-to-day operations but also in shifting the core vision of brand.

This result will be presented in two separate parts: Firstly, the leader's role in instigating and enabling change in day-to-day activities like new product development. Secondly, the leader's role in driving long-term cultural change to embrace design led innovation.

The importance of vision to change in new product development

A lack of vision and strategy communicated across the firm was seen to contribute to the difficulties the firm experience in bringing new products and services to fruition. As something that gives meaning to the organisation's activities and provides a sense of identity for employees; vision defines the basic philosophy and values of the firm. Without a strong message communicated about the future of the company and motivation regarding the direction of growth, it can be difficult for employees to make accurate, self-directed decisions on a day to day basis that add value to the company.

Described by several participants as 'reactive', the case firm has typically developed new product from a desire to play in the same market space as competitors or from adding a customer project design to the product portfolio. In effect, it was agreed by the majority of participants that the design objective is not backed by the market and developed without a clear and

shared value proposition to guide the designers. As one participant, a designer stated, ‘*‘I still don’t know what market the product went into. I know it’s a solid product but I don’t really know what it’s for and I think we lost sight of that a long time ago…or whether we even knew.’* Consequently, the design development lacks a program with defined constraints. Another participant expressed: *‘…with no design freeze…we’re still changing the product, we still haven’t got full clarity of what the customer wants and what the purpose is.’*

Consistent reference was made towards the need to get a better understanding of the customer problem in the early stages of new product development in order to develop a more cohesive and robust brief for the solution. Before time is spent researching a design problem; employees should be able to critically assess a project’s value to the firm by knowing its alignment to the company vision. In other words, if the company vision is not clear, it is very hard to know if a project venture reflects the firm goals and growth paths. For example, if a potential product or service indeed solves a customer’s problem, does the solution align with the organisational product and market strategy? Furthermore, if a project is pursued, does it fit with the organisational vision for the future?

Being able to answer these questions relies on the reinforcement by upper management about what the firm’s core product and service offering encompasses. In the case firm, opportunity to grow may lay in the active endorsement by the family stakeholders of a knowledge/service centric vision as oppose to a product centric vision. *‘So it’s more than just a (descriptive of product) – it's technical solutions’* explained one participant. Another participant echoed this and suggested the need to move away from the small business supplier mentality to one that can deliver real specialist knowledge - *‘We need to be more scientific in our approach; we have to be delivering targeted value.’* In turn, this will empower the design team with a stronger understanding of what the product ultimately needs to achieve, the type of

customers it will serve and the accompanying services that will build relationships with the brand.

The preliminary results from the interviews, focus group and reflective journals indicated that a key gap in fast tracking growth for the case firm is the process for new product development. This is supported by the difficulties the researcher encountered in creating buy-in with operational teams of the firm. Without the endorsement of leadership and active promotion for change, the ability for employees to diverge from the existing processes and responsibilities was limited.

The importance of vision in driving long term cultural change

This reinforces the fundamental need of commitment and visible engagement by higher management to empower employees to allocate sufficient time and energy into implementing change strategies - not just in the day-to-day operations but also for the longer term. As indicated, these barriers are not borne out of unawareness and recognition of the need to act is certainly not lost on management. This is exemplified by one participant, '…*well definitely it's more important than anything else we do right now, and it perpetuates through everything we need to actually pause to think critically'*.

The lack of backing by upper management to instil urgency for change as part of the long-term vision also left participants with a divided sense of responsibility. Participants expressed the dilemma they experienced between the need to pursue a design led approach (or any change initiative) but also maintain existing responsibilities to the core business. Limited time and pressure to deliver meant that sufficient traction in any change initiative lead by the researcher was either disbanded through other demands or simply could not get a wide enough body of people to build growth.

Given, within family owned business, the decision to trade off existing core activities with those that build strategy for the future fundamentally need leadership to drive (and permit) engagement. Still, even for leadership who wholly recognised the need for innovation in globalising economy, '*…we no longer have this buffer of the ocean that's protecting us from -- you know, protecting us from us proving ourselves',* found it difficult to step away from the present to discuss the future. Further emphasising the major challenges in developing an implementation framework that can get traction for real change yet maintain the current business model sufficiently in the interim. The challenge to overcome is described by one participant as, *"Short term cash out trumps the vision.*

8.3 Solving problems individually

This finding refers to the observation of how a highly individual project approach inhibits collaboration and the opportunity to create innovative solutions. The results indicated that a level of isolation existed amongst employees, which was seen to pose limitations on how knowledge is shared and how a collective action towards strategy is achieved. This is an important result because central to the design led philosophy is collaboration. The opportunity for the firm to collaboratively develop radical innovation is largely inhibited by the time spent solving short-term problems in isolated projects and departments.

Interestingly, participants identified *departmental* weakness in communication, yet attributed the isolation of key individuals to routine and personality differences. Discussing the length of project duration, one participant said, "*Projects…were driven by personalities more than anything. (Pointing to other participants)…so you have a personality, just like you're a personality, you're a personality so you drive your own little bandwagon."*

This working isolation was observed as most prevalent in the firm's project development and delivery operations. Multiple participants noted the gradual disbanding of various strategic team initiatives including R&D teams, specific project teams and a weekly strategy meeting. In these instances, there was always '*a lot of (collaborative) momentum at the beginning of a change process'* yet as time progressed and other demands crept in, '*it just sort of peters out and then…people tend to revert back and… we're not quite successful at implementation.'* This was further emphasised by another participant who expressed frustration at trying to collaborate, '*nobody really wanted to be there and I just thought well why, you know, you do your own bloody thing and I know what I'm doing and…you know what you're doing*.' Consequently, the participant explained how he felt more productive when working alone. In these instances, the team approach is compensated with intermittent meetings, which were described as 'updates' rather than strategic ideation discussions. As a result, one participant said, *"…that's definitely one thing that we don't do well is the sharing of ideas, and that's why you've got all those same people attending all these meetings."*

It is not the intention to suggest that divergent personalities impede project delivery; rather the results here indicate that personalities *working in isolation* may not speed up project delivery nor enrich project depth. In this instance, substituting a collaborative approach lessens the opportunity for rich information exchange through formal techniques and tools.

Working in isolation on new projects most likely stems from a need to expedite projects and compliments a sense of control over the activities involved. Pursuing greater collaboration was suggested as "…*a massive culture shift for a lot of us…people will sometimes take power from holding information and you know, obviously dealing with different personalities in the company…I think that would be a challenge for a lot of people."*

Creating dialogue between colleagues to avoid assumptions and create consistency was also partially reasoned to the low level of policy and procedural enforcement. With many long-term employees, the firm has a unique and strong culture of community, which has led to a 'local language' between departments and individuals in the company. The difficulty here lays in the dissemination of knowledge and raising all employees to an even knowledge platform. In embarking on a design led initiative, it was made clear, "*we need to talk the same talk and speak the same language otherwise it's going to be impossible."*

8.4 Involving and leveraging people

Involving and leveraging people refers to the power division that occurs between not only departments but between the operational and strategic sides of the firm. Operational, referring to those in design, marketing, production for example while strategic refers to executive, upper and middle management. While it is natural to have power weighted with management, this observation refers to the limited scope operational staff felt in being able to lead or engage in a design led approach. Equally so, the data indicates that it could be opportunistic to leverage strategic contribution towards initiatives such as design led innovation, from the operational level of the organisation.

This is supported by most participants whom believed that while the firm has plenty of skilled people to potentially lead a design led initiative; the biggest barrier is in finding open channels and procedures to utilise those skills more effectively. A participant stated, *"The people and the resources are here, the drive and tools are here, but are stuck in current thinking and models."* Another participant with potential to influence change explained his inability to fully engage in additional projects, '*Trying to get new innovations while project managing people as well a project pile that big which we're constantly trying to tick off…it's like treading water.'*

Bottom up approach

The data revealed that while the case firm placed empowerment as a priority, there was limited translation of that throughout the firm. *'Upper management might be trying to empower people…but people don't feel empowered and they feel they need to get the collective ok.'* Limited allegiance within the design and engineering department (operational division) specifically was seen to be a key factor in limiting a design led approach. One participant noted, *'Ideally if you want to keep those people (design and engineering) here and keep them entertained…it's the perfect opportunity to capitalise on those skills they have.'* Cultivating those skill-sets should lead to a level of increased responsibility and authority.

Furthermore, the results revealed latent opportunities to energise innovative change through the empowering of employees with lesser authority in the business. It was made clear that there were opportunities to drive innovation through capitalising design and engineering skills– a participant stated *'…you have new ones who probably have ideas… if you ask them some of the older ones would probably be the ones that are pulling them back, saying stop, stop, this is what you are supposed to be concentrating on.'* Also, facilitating the information exchange of both low-level and high-level strategic direction was seen to inhibit some employees from becoming involved in the conversation and consequently their ability to contribute ideas confidently. One participant noted, *'…at the senior management level, it (communication) is very good. Then trying to pass that information on to the lower level team is always a difficulty because not everyone can go to all these meetings.*'

This was supported by some younger design participant's perceptions that their abilities to influence the engagement and transformation to a design integrated company would be limited to within their own departments. For example, a participant: *"I would be able to influence colleagues in my immediate vicinity, but my influence elsewhere would be limited."* Another

designer limited his contribution to facilitating learning: *'being relatively new to the company, my influence would be minimal but being a designer, I think…I could assist others in seeing the positives at integrating design into the current model."*

Failing to engage, leverage and communicate at this level weakens contribution from persons less innovatively bound by the existing culture of the firm. Recognition of the need to engage multiple facets of the company to create an enriched understanding of the opportunities for innovation was made through one participant, *'We need broader engagement because…it is a change management initiative so if people aren't engaged or aren't involved in the process we are more likely to have roadblocks.*

In conclusion, taking the opportunity to involve a wider group of people from the organisation in discussions was seen as key area to leverage. An aversion to involving employees outside the immediate scope of a project or problem because they may not be of direct contributory value to the discussion risks discouraging and undervaluing people (with relevant skills) of the organisation. One participant noted the opportunity to gain valuable insight and knowledge through a mode of discussion other than getting key people together in a meeting. He said '…*one of the ways to go forward would be to internally have a lot more conferences …I mean the other word for it is training…but when you say that it seems to have such a bad feeling… I've got bucket loads of information and you've got bucket loads of information… if we could all use all of that stuff I think we'd be in a much better space and that's training. It's sharing for the purpose of training.'*

8.5 Building customer relationships

As the final observation, this result was less pervasive in the data but nevertheless a barrier to applying design led innovation. The result refers to the participant's perceptions of the customer's role in developing radical

innovation. Throughout the data, it became clear that a common theme was the firm's apprehension and lack of understanding of how to approach the customer to maximise the opportunity to create valuable insights. Furthermore, how the firm may be challenged to speak to the customer in a new language, outside of product centric conversation.

As a fundamental element of the DLI approach, the development of close relationships with the customer to develop strategic value propositions should become an ongoing and commonplace occurrence. In other words, the customer should become an extension of the firm, where it becomes natural to engage in conversation and seek insight on ideas and value propositions the firm can then prototype alongside the customer.

Some of the challenge in doing so was attributed to the perception that the firm's reputation may be risked by engaging the customer in way that is not consistent with existing activities. As the dominant channel of engagement with customers is through sales representatives, the firm's history of communication is largely based on a 'supplier-to-buyer' discourse. Consequently, the challenge is transforming that relationship and conversation into 'supplier-to-partner' discourse while not compromising the existing relationship.

Extending the conversation beyond product

The notion that the firm limited customer interaction to predominantly product was further validated by the tendency for internal conversation to return to a product centric focus. This is an important finding to the research as it points to the need to unite the company with a cohesive vision of how innovation can be of value *beyond* the product alone. In turn, the customer can then be seen as more than just a user of the product but a key partner in designing radical innovation.

While some participants were able to grasp the value of extending the conversation beyond product, '*Yeah you can go and talk to the customer, but it's about looking at what else is going on around them, that is actually allowing that product to be there in the first place. Generating concept ideas which aren't product related.'* Other participants including management certainly struggled with the idea that the dialogue between customer and firm may not be centred on the tangible product. Discussion about customer engagement strategies centred on things such as adequate product sizes and aesthetic preferences. A definite uneasiness was present regarding how one would initiate conversation about non-product related elements without appearing foolish. In this instance, the participants perceive the firm's core output as predominantly a manufacturer of engineered goods and therefore their model for engagement with customers has a dominant product focus.

For example, when asked if the participants perceived the case firm as innovative, a participant responded, *'I think so, but it can be a bit difficult when it's boxes'.* Furthermore, the specifics of the product requirements were seen to limit the capacity for innovation – *'we are constrained by the standards …we need strength, longevity, safety…all of this is very well designed so we're kind of a bit locked in after that.'*

Some participants saw the industrial market (in which the case firm operates) as having limited receptiveness to innovative solutions. As stated by a participant, *'I don't think it's a market where innovation drives the products and I don't think it's a bad reflection on us; I think it's just the reality.* This reinforces the opportunity to elevate the firm's core activities from steel fabricating mentality to a technical solutions mentality. As one participant noted, *'It comes back to being a solution provider rather than just selling the product. So that should be part of the message, that's part of what we need to communicate when going to the customer.'*

Growing in the market as technical specialists has the capacity to alter employee's understanding and perception of innovation and in turn alter the objectives when conducting customer research. Another participant elaborated, "*We look at ourselves as a business for manufacture, not as a product and service business, which I think are two entirely different things. We're too focused on making boxes.'*

8.6 Summary

This chapter has presented the key results that emerged through the data from 25 qualitative interviews, reflective journal and a focus group. The results represent key barriers that restrict or limit the firm engaging in a design led approach. The most salient of the observations in the data were presented first within the chapter, to the least salient at the end.

The first observation presented the firm's weakness in vision dissemination and the participant's reduced agency to participate in change initiatives without the endorsement and presence of the family leader. The second observational barrier was the firm's tendency to work in isolation consequently limiting the opportunity for collaboration and new thinking. The third observation identified limited capitalisation of skill typically from those in the operational segments of the business. Furthermore, that these people could be particularly beneficial to driving new thinking and innovation. Finally, the last result identified the firm's need to alter the customer relationship to be more open and facilitative to generating deep customer insights. This means altering the perception of value as product orientated only to encompass the potential for the entire business model to create value.

The following chapter discusses the opportunities for the firm to move past the barriers outlined in this chapter, towards design integration. Furthermore how these opportunities align with key issues identified in the literature review on family owned business, manufacturing SME's and new product development.

Chapter 9: Discussion

9.1 Introduction

The key observations outlined above emphasise the fundamental difficulty in achieving company-wide transformation within a family owned SME. Of course, the scale of such challenges and the measures required to address them reinforces the idea that design led innovation cannot be seen and treated as a discrete event, nor a series of steps or stages. Understanding these core challenges in specific reference to design led innovation however, allows a new understanding which has previously been unexplored in literature. Identifying these challenges is the first step in helping family owned SME's to implement some strategies and capitalise on opportunities for design led change. To recap the previous chapter, the key observations that were identified as being the major inhibitors for design led change included:

Vision from family leadership to drive change:
A major theme drawn from the data was the importance of family and particularly founding family leaders to be present during the design led initiative to communicate the vision and drive growth in the long term. Without the endorsing and physical presence of leadership to communicate the purpose of the venture, limited contribution and buy-in from other people in the company occurred because of responsibilities to other day-to-day priorities.

Furthermore, the data suggested that an unclear firm vision could contribute to the difficulties the firm experience in bringing new products and services to fruition quickly and with a differentiated value proposition. This is because decisions on design elements are not grounded through the objectives for future growth and how that translates back into the day-to-day operations. This reinforces the importance of marrying organisational vision with the

objectives and activities of new product development to achieve design integration.

Solving problems individually:

The second observation challenging design led implementation was the tendency for key individuals like project managers and product managers to work through complex customer problems in isolation. Ultimately reducing the opportunity for challenging and maturing ideas and ultimately radical innovation. Reasons cited for this included: time constraints of project deadlines, divergent personalities and working processes of different people and a separation between those in the operational roles of the organisation with those in strategic roles.

Involving and leveraging people:

Observations emerged from the data suggesting that employee skill and expertise, particularly from operational sides of the firm, wasn't leveraged enough to enhance knowledge sharing and encourage innovation. It purposed the opportunity to engage those with less tenure in the firm to harness new thinking and perspective towards problems. Particularly, because they are perhaps less inhibited by the existing culture and therefore able to think more creatively about the potential for innovation.

Building customer relationships:

The final observation that emerged through the data suggests that the firm need to work on building a partnership with customers that creates an open source of insight and strategic direction. A key limiter of design led integration was the firm's inclusiveness of the customer in a very small part of the process of design development. Most commonly employing the customer to provide input on product orientated features and cosmetic elements. Understanding the benefits and tools to navigate co-creation activities with the customer that broadens the scope for customer insights will be fundamental to the firm being able to create innovative offerings.

This discussion chapter presents the subsequent opportunities that are borne from the barriers discussed in Chapter 8. Figure 24 below demonstrates how the observations described in the previous chapter will frame this chapter and the structure of the discussion.

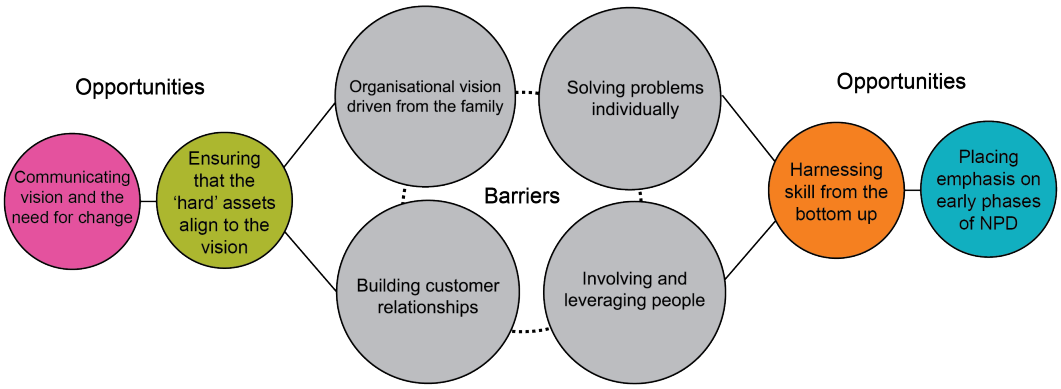


Figure 24 Identified opportunities for design led integration

As Figure 24 illustrates, four key opportunities will frame the discussion (shown in colour). These have been drawn from the four key barriers (shown in grey) that were identified in the previous chapter. The opportunities have been divided into two key areas according to their relativity to one another and their proximity to the extant barriers. The opportunities are identified as key actions that will enhance the firm's ability to integrate a design led approach.

Figure 25 shows the importance of each opportunity in increasing the firm's capacity to engage in a design led approach. Furthermore, a 'staged' approach in executing the opportunities is illustrated through a 'steps' visual. The opportunities to enable a design led approach will be discussed in this sequence.

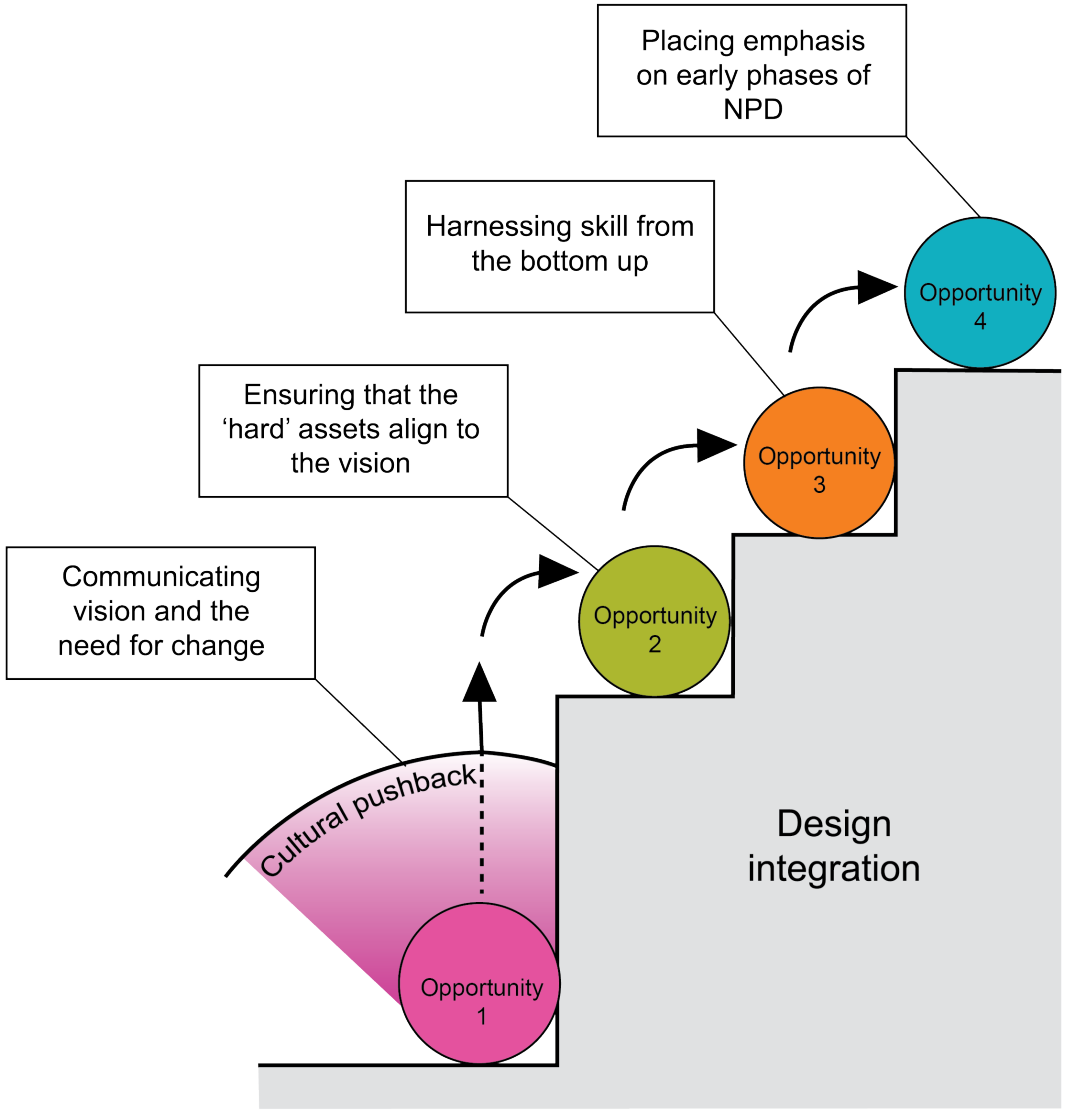


Figure 25 Importance of opportunities in achieving design integration

9.2 Opportunity 1: Communication of the future vision and the need for change

Identified from very early on in the study, the need for key family stakeholders to be present and engaged in actively driving change was cited as critical to successfully achieving change. The limited pockets of 'buy-in' that the researcher alone was able to achieve throughout the firm validated this idea. While the value of design led innovation was recognised by these individuals, it was not sufficient in driving significant behavioural change.

One could speculate that the unfamiliarity and limited authority of the researcher may have contributed to limited engagement. However, literature on family owned SME's points to the fact that because power is most often centralised in a family owned firm, they are in fact the integral interface between vision creation and enabling change to occur (Family Business Australia, 2011, Harris,1994; Sharma and Chrisman, 2007). In other words, change initiatives like design led innovation fundamentally rely on the leader as the 'traditional caretaker of the company vision' to instigate and disseminate the vision across all levels of the organisation.

Alone however, the dissemination of the company vision appeared as only one of the elements required to achieve behavioural change. According to literature, this is because the leader's role extends further than just vision creation but to the creation of *culture* (Family Business Australia, 2011, Harris, 1994; Sharma and Chrisman, 2007; Hall, 2001). Culture of course is indelibly linked to a firm's process and hierarchical structure, which affects employee's ability to engage in divergent or explorative behaviour. In a family owned firm it is important to remember that the extant culture is likely to be more heavily embedded than in non-family owned firms because of a typically higher degree of emotional investment by employees and leaders (Institute of Family Business, 2011; Miller et al. 2001; Hall et al. 2001; Sharma et al. 1997).

So if the case firm truly want to engage in a design led approach, the most critical opportunity is for the family leader to not only communicate the vision and goals of becoming a design integrated company but to *actively endorse* and *enable* behaviour change by being present every step of the way. This opportunity is highlighted in Figure 23 as the biggest and most challenging step to becoming design integrated because it could be perceived as diverging from the existing business model and compromising the existing culture (Schroenberger, 2007). Equally so, this step is critical in making sure

the entire company is working towards a united vision and can allocate time freely towards making design integration a reality.

While the need for leadership to be present in driving change is not particularly surprising, an unclear vision (identified as a barrier for the firm) presents some contrasting findings to the literature.

Firstly, a number of authorities of family business literature point to vision as a strength which enables family owned firms to position themselves strategically for the long-term. It also documents the propensity of the family firm to retain employees and the degree of emotional attachment they may experience to the business model 'as it once was' (Hall et al., 2001; Oxtoby, 2002; Miller et al., 2009; Denison et al., 2004). Furthermore, the case firm among other family owned firms have clearly demonstrated their ability to grow in the long term, which could suggest that a strong vision is, in fact present within the firm.

The results however reveal that perhaps not *all* levels of the business share this vision, not voluntarily but perhaps through a breakdown of communication between the operational and strategic levels of the business. This is in concurrence with Roy and Gupta (2007) and Smith (2008) who suggest that family business management tend to keep strategic plans close and sometime experience challenges in disseminating information.

This suggests that the long-term employees or family members who could champion the vision throughout the organisation may share a very natural predisposition to uphold the family vision, however over time it becomes implicit knowledge as oppose to explicitly communicated. Over time, deliberate communication strategies for *explicitly* sharing the firm's strategic vision with operational employees becomes less of a priority. Therefore failing to inspire the vision about the landscape that the company will (or

wants to) operate in, the marketplace it will compete in and how those employees play a role in getting there (Rasmus, 2011).

Other literature highlights the difficulties SME's sometimes face in spending time developing and cultivating the vision of the firm and continuously communicating it back to all parts of the organisation. The inability to benchmark the vision of a firm with definitive controls is perhaps another inhibitor in establishing a strong core processes that continuously communicate and build the vision. Moreover as a 'soft asset' of the firm, priority often shifts to the day-to-day management of the 'hard assets' of the firm such as production, design, financial control and human resourcing.

Ultimately this presents the ultimatum of change – until time is availed to focus on the future or 'soft assets' of the firm, real traction across the 'hard' aspects of the firm is very hard to achieve. Literature suggests this is because vision is very difficult to quantify and so investing not only in an intangible asset but one that cannot show direct measurable returns becomes a very low priority. Preference to focus on the hard assets of the firm over the soft assets of a firm are described by Javed (2013, Innovationmanagement.se):

"Vision, on the other hand is far too complicated and difficult to map out when modelling its dimensions and applicability. Vision sometimes acts as an immense magnet, attracting all kinds of fly-by ideas – whether metallic splinters or full-sized objects, these ideas cling and, over time, distort the original shape of the magnet."

The opportunity for the firm to initiate and prioritise a design led approach lies in the hands of the family leader to orchestrate change by not only communicating broad organisational vision but how that vision transcends into the people, the product, the services and the decisions made on a daily basis. Opportunity 2 expands on this notion by taking a closer look at how

the leader's vision could be particularly powerful for a design led approach in activities like new product development.

9.3 Opportunity 2: Ensuring the 'hard' assets of the firm align to the vision

Reflecting on the investigation, one of the major difficulties was the non-commitment to redirect resources away from the core business to pursue innovation. Consequently remaining in limbo between understanding the importance of change but unwillingness to compromise existing projects and their completion. Consequently, the challenge was not about how to innovate rather creating the *time* to innovate. As a result, these projects absorbed the time and focus of design teams and the decreased the opportunity to explore new ideas in product development.

Consequently, the importance of vision being aligned to the way behaviour is constrained by current design activities of the firm is critical. Here a number of issues restrict design teams from being able to engage in a design led approach. The structure of the firm, the number of projects that need to be worked on, the environment and the normative culture towards creative thought.

While these are all important opportunities for the firm to address, the first critical step is for teams, particularly in design, to re-interpret the scope for innovation. Essentially, altering their perception about the potential to create innovation beyond the existing product parameters and company capability. Furthermore, re-establishing their role as fundamental in driving new innovative ideas and translating that into new products and services. This requires the family leader to not only inspire a proposed future for the organisation but also *permit* a change in behaviour to achieve the proposed future.

Key to this is creating the environment to elicit creative behaviour. Resource structuring aside, the opportunity for the firm to make a visual commitment to design led change could be through the purposeful allocation of a space that communicates the importance of behaving differently.

An initial indication that this would be a beneficial strategy was seen through an external workshop run on design led innovation which provided the 'breakthrough moment' for a select group made up of multiple disciplines in the firm. Following the workshop, which took the participants away from the everyday environment, the team heightened their engagement with the design led philosophy and began to use design thinking into their day-to-day decisions. Furthermore, the group began to play an important role in critically questioning the value of projects and how they were currently delivering upon the customer's needs. But also looking at new projects or ideas and how they should be internalised – perhaps by identifying core criteria that categorise new projects as radical or incremental and channel them into subsequent areas of the organisation.

The opportunity to use such a group and environment to align the organisational vision to the hard assets of the firm plants a seed to expand design led change into other areas of the firm. Furthermore, it would set precedent for how the customer is approached to feed insight into all areas of the business rather than just the product-related aspects.

The implications of this approach are relevant to a number of research strains discussed in this thesis. Namely, family business literature which, until now has not been examined in relation to the application of design led innovation. To better understand the potential of this opportunity within a family owned firm in driving design led change, the design led innovation framework has been re-interpreted (and deconstructed) below in Figure 26 to show the family leader's role in driving design led innovation as well as the potential to use a champion team to align the soft and hard assets of the firm.

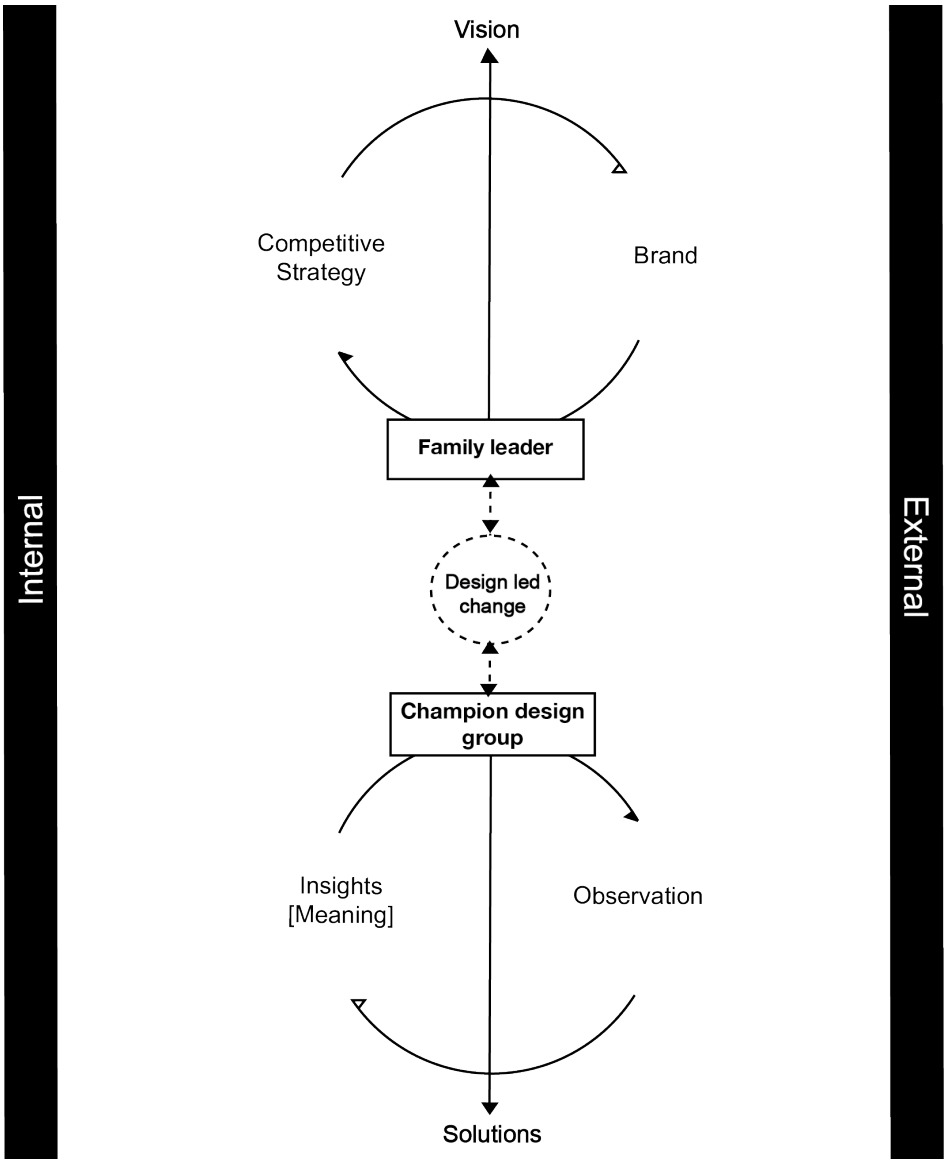


Figure 26 - Adapted from Bucolo and Matthew's (2011) Design led innovation framework

Most noticeably, the framework has been changed from a flat orientation to a hierarchical orientation to reflect the literature on family owned firms where power is generally centralised at the top (Miller et al. 2009; Family Business Australia, 2011; Hall et al., 2001; Institute of Family Business, 2011). But also because the family philosophy or vision within a family owned firm is often more emotionally bound to key strategic stakeholders in the upper ranks of the business than lower operational areas (Family Business Australia, 2011;

Zahra et al. 2008; Harris et al. 1994; Denison et al. 2004; Sharma et al. 1997).

This coincides with Bucolo and Matthew's (2011) theoretical base of design led innovation because the research suggests that for DLI to be integrated into family businesses, action plans need to facilitate bridging between the operational and strategic facets of the business. Not only through empowerment but also through clarity of company vision. Perhaps what has been identified further to Bucolo and Matthew's (2011) design led framework is the clear difference in ability/influence between the design catalyst and the owner of a business in being able to bridge this gap between operational and strategic sides of the business. This emphasises the importance of a design champion group and the family leader working collaboratively to bring together the two separate organisational dimensions.

Consequently, a new introduction to the adapted model is the family leader positioned in a more central location to identify the importance of disseminating 'vision' throughout the lower ranks of the firm. Once again, this is because the research showed that it was fundamental the family leader was visually present at all levels of the organisation to reinforce the vision and endorse a change in behaviour. 'Vision' has been placed at the top of the model to communicate its overarching and pivotal role in driving design led integration within a family owned firm.

Finally, the opportunity for a champion design group to be introduced into the firm is shown centrally located in the model. As discussed, this team would help to carry the vision from the leader into the operational facets of the company such as product design and project management. But also provide information back to the strategic sides of the firm about the value of new and existing projects to the company vision and their impact on growth strategies. Particularly in the early stages of trying to achieve design led change, this team would help by both introducing new design thinking tools and

techniques but also challenging upper management to either cut existing projects or cultivate stronger, radically different ideas to greater maturity.

This is important because as identified previously in the literature, a potential barrier to innovation was for newer generations of a family business to demonstrate increased financial frugality and be less inclined to embark on risky entrepreneurial ventures (Serrasqueirro et al. 2012; Hall et al. 2001; Westhead and Howorth, 2006; Family Business Australia, 2011).

In summary, opportunities 1 and 2 point towards the importance for the whole organisation to understand the necessity and value of design led change. This fundamentally rests on the family leader to visually endorse the change in behaviour and communicate the core vision of the organisation. This approach will not only make the hard and soft assets of the firm more meaningful and resilient, it will make the organisation behave as a learning organisation, and that may just be part of its vision (Rasmus, 2011; Javed, 2013).

9.4 Opportunity 3: Harnessing skill from the bottom

Throughout the investigation, the notion that creative skill from people in the operational side of the business could be more effectively capitalised was indicated through formal data capture and interacting with participants from areas like design and engineering.

Hand in hand with the opportunities outlined previously, there is potential to harness the skill sets of employees from the operational side of the organisation by empowering them to contribute meaningfully to strategic discussions. Enabling key employees from areas such as design and engineering to join in the conversation with the long-term stakeholders both challenges the status quo and provides an enriched perspective of problems. Family business research of Hall et al. (2001), Oxtoby et al. (2002) and

O'Regan, 2006 suggest that new initiatives, which are implemented via increased empowerment can avoid 'cultural bypass' as opposed to being concentrated at the management level.

Restricting involvement in strategic problem solving also limits the opportunity for others to challenge and explore alternative ideas and thinking. Consequently risking an enriched understanding and unpacking of an idea that comes of a collaborative approach. This includes critical processes such as prototype exploration and consistent re-framing of the customer's problem, which is inherently a creative process and enhanced through facilitation of dialogue and communication.

Leveraging the design and engineering sectors of the business in turn leverages their capacity to have a heightened understanding of the strategic goals and vision of the business. In turn it would also capitalize on the skilled teachings of the individual designers and provide them with a renewed sense of purpose and satisfaction. Ultimately enabling them to deliver more strategically aligned products and services.

This is particularly relevant to the literature discussed regarding new product development in manufacturing SME's where a key barrier to engaging in a design led approach is the tendency for these firms to use external design consultancies to develop strategic briefs for products and services (Hovanessian, 2008; Mills et al., 1995). This is because it lessens the opportunity for the firm to cultivate internal, strategic design strength in developing and managing complex problems. Furthermore, if solutions are created external to the company, this may not help to align the firm with the future corporate vision. Yet, in some instances, third party consultants still remain an important external resource because they can offer a broader perspective and challenge the firm from a strong design knowledge base.

This research supports authorities like Hovanessian (2008) and Mills et al. (1995) because design thinking, at its core, is of most advantage during the early phases of new product development – when ambiguity is high but the opportunity to learn is also equally high.

If the firm can however, build capability through the operational teams, in particular the design and engineering areas through environmental stimulation, clarity of vision and purpose, learning and empowerment – the opportunity to enhance innovation would be greatly increased. Stimulating other areas of the organisation opens the doors to knowledge being imparted in new ways. This means, processes that are traditionally grounded in an engineering/manufacturing orientation could be complimented with alternative methods to creatively solve problems and understand the customer (Dym et al., 2005). Creativity is an important facet of becoming a design integrated firm and cannot simply be instructed or carried out in isolated instances, which is why it is opportunistic for the firm to empower people in the crux of operations to 'live' it. Creating an environment that is conducive to this behaviour and does not alienate design thinkers will also be key to building strategic design capability within the firm.

These people and the environment they work in also play an important role in how effectively the early phases of NPD are deconstructed and understood. As an area that has previously struggled in the case firm (as validated both formally by data and experientially), this is the next opportunity to be discussed, which could assist the firm in becoming design integrated.

9.5 Opportunity 4: Placing emphasis on early phases of NPD

The opportunity for the firm to spend more time during the early phases of NPD is a multifaceted and far-reaching task. The single most influential phase of NPD that distinguishes radical innovation from incremental innovation is during the early phases of problem identification. Here, the

problem is stripped, built, re-framed and re-interpreted to formulate an understanding of how the solution should attend to the needs of the customer (Dorst, 2011; Norman, 2009). As a result the designed solution reaches a much higher degree of maturity *before* significant monetary investment and is also driven faster to manifestation because of clear design constraints (Bucolo and Wrigley, 2012)

As briefly mentioned, the challenges that were observed regarding NPD (with particular relevance to the early phases) within the firm revolved around three key areas:

1. A lack of direction and clarity of the design purpose because the problems that are trying to be solved are not benchmarked against company vision. Furthermore, because designers are not immersed in the customer's problem to find meaningful insights.
2. The time taken from concept to production - which is a consequence of the above challenges because the objectives are constantly re-interpreted and tend to become more and more ambiguous as time goes on.
3. The limited degree of novelty in the design – occurring because the criterion of 'innovation' is based on the degree of newness to the organisation rather than to the market.

While the preceding opportunities/strategies described in this chapter help to emphasise the early phases of NPD, the focus here is on the earliest point of idea realisation. Meaning, the point at which new ideas are exposed to the firm and are assessed to determine relevance, potential return on investment, brand alignment, capacity to execute and degree of novelty.

Every day, a range of ideas and opportunities are communicated explicitly and implicitly around the organisation. While the firm tends to accept many ideas and reject few, the opportunity for the firm to create a project scale upon which ideas are categorised but also pursued or rejected. By

developing such a scale, there is scope for the firm to purposely question the degree of novelty (according to the market) of the idea and allocate capital and human resources accordingly. As a result, key resources and nurturing new ideas to achieve a greater level of design maturity in a shorter amount of time, an integrated value proposition and most importantly, a stronger competitive advantage.

Figure 27 illustrates the overarching principals of how such an opportunity could be placed within the case firm. As ideas are made apparent to the firm through various sources and channels, the champion design team would take on an advisory research role using a design led approach to determine both the value and application of the idea to the firm. This would enable ideas (in particular radical ideas) to be harnessed with a stronger strategy to grow and nurture them into the market.

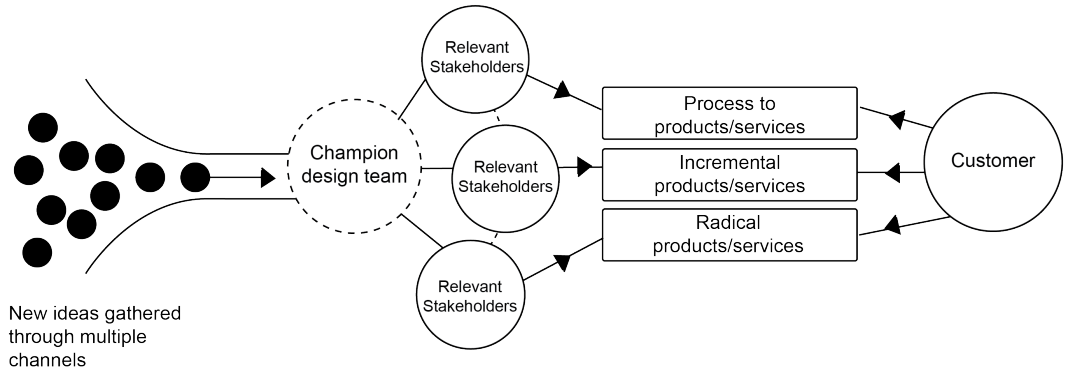


Figure 27 – Role of champion design team in categorising and filtering new ideas for project development

This is supported by research discussed in the literature review on how businesses can develop ambidexterity in managing future-orientated business activities with current business activities (Lawson and Samson, 2001, O'Reilly and Tushman, 2008). The ability of the firm to sense external opportunity and be aware of the potential is well matured however; actually *reconfiguring* the business to seize and cultivate those opportunities is where

the true determinant of design led commitment is revealed. Ultimately, “while operational capabilities may provide for competitive advantage at a given point in time, long-term success inevitably requires that leaders reallocate resources away from mature and declining businesses toward emerging growth opportunities” (O’Reilly and Tushman, 2008, p. 191).

Furthermore, by implementing some categorical variables to better identify where the most innovative value can be created, the firm can track the outcomes based on the effectiveness of strategic design resource invested. This is supported by research that posits the importance for measurability to be a key element in generating ‘design’ buy-in and accountability within the firm (Hovanessian, 2008; Mills et al. 1995). In this case, if a design led approach is to be more accountable for strategic problem solving on a business model level, ‘it is necessary to develop certain ways to evaluate design contribution to business performance and business success’ Hovanessian, 2008, p10). This could also be a fundamental strategy in navigating the traditional, engineering culture of the case firm to become more design led.

9.6 Summary

The opportunities for change described in this chapter are in response to the identified barriers to design integration outlined in Chapter 8. Central to the firm engaging in a design led approach is the company wide, unified understanding of the need for change and the value of design led innovation. The research indicated that in a family owned firm, the family leader plays a pivotal role in communicating this in the company vision and endorsing the change throughout the operational and strategic sides of the firm.

The teams operational in NPD directly manifest this vision into products and services that play a central role in establishing a design thinking culture and driving design integration throughout the firm. A number of opportunities exist in this area that could, in turn orchestrate change in other departments of the

company. These opportunities included: the purposeful allocation of space that can create an environment to elicit new behaviour. The formulation of a ‘champion group’ made up of various disciplines from around the firm who are able to bridge the gap between operational and strategic facets of the firm. But also ensure that the products and services offered by the firm align with the vision. The group would also work closely alongside the family leaders to both maintain momentum of change and ensure that customer insights are heard and translated in the internal activities of the organisation.

Chapter 10: Implications and Recommendations

10.1 Introduction

This thesis presented the findings from an action research study examining a family owned manufacturing SME's ability to drive innovation through a design led approach. Literature on family owned SME's and manufacturing is commonly centred on the behavioural, organisational and cultural aspects that may inhibit innovation. This research fills a gap concerning the specific strategies that may overcome these barriers so that family owned SME's might activate innovation to gain a better competitive difference in the marketplace. More specifically, the design led innovation framework has been examined (delivered through an embedded action research approach) to determine its capacity to drive change.

Through an action research approach, rich data has been extracted through three key methods: 25 qualitative in-depth interviews; focus group and a reflective journal. Such an approach enabled the researcher an unparalleled perspective and exposure to the participants, the firm and the culture, which binds them all together. In turn, this enabled targeted design led strategies to be used throughout the engagement.

Thematic analysis identified four key observations that limited the firm's ability to engage in a design led approach. These included:

- An ambiguous organisational vision that reduces the ability for employees to make targeted decisions on a daily basis and participate in divergent behaviour and innovation activities.
- The tendency for key stakeholders to work in an isolated manner when conceptualising and developing solutions to customer problems.
- Employees from the operational side of the firm could play a greater role in challenging ideas and driving creative problem solving.

- Limited consultation of customers during new product development and a tendency to default to feature-based inquiry.

The implications of this research are discussed in this final chapter through three key research strains: the implications of the new knowledge to the case firm, the implications of an action research approach and lastly the theoretical implications. With such a vast collection of rich, experiential based data, the researcher will also outline some final reflections. Finally, the contribution to the knowledge and recommendations for future research will be presented.

10.2 Summary of Findings

Firstly however, the opportunities, discussed in detail in Chapter 9, for the firm to integrate a design led approach (based on the observations above), are summarised below:

Leadership vision to permit engagement: Central to the firm embarking on design led change is the absolute need for the family leader to be the one who communicates the vision of the firm and the need for design led change. Without purposeful and targeted endorsement from leadership, behaviour defaults to the day-to-day responsibilities and further entrenches the existing business model and operational culture. The findings suggested that this is the single most important opportunity for the firm to act on because it grounds the terms upon which the firm want to grow - which can then be more confidently committed into strategic activities on a daily basis.

Bridging operational and strategic activities: When establishing buy-in of design led innovation, it is critical that the hard assets of the firm (tangible offerings) are aligned with the soft assets of the firm (the vision and strategic orientation). Furthermore, that the organisation reflects this by aligning the strategic levels of the firm (who typically manage soft assets) and the operational levels of the firm (who typically execute upon hard assets). This

fundamentally relies on teams predominantly in the design and engineering departments to not only be leveraged into strategic discussions but to be empowered to challenge an idea's relevance and value to the holistic organisational vision. Equally so, it is crucial that upper management commit resources towards enabling creative exploration of ideas that do not immediately serve the day-to-day operations.

10.3 Implications of Findings

The implications of this research are relevant to three key bodies: the case firm; the research design and lastly the theory on design led innovation and family owned SMEs.

10.3.1 Implications of knowledge to case firm

As with any change initiative, the road to transformation is rocky, uncertain and at times very ambiguous. Furthermore, as described in the results, a large determinant of the outcomes achieved through such an engagement is the organisation's capacity to commit resources and time to integrating design as core strength.

So moving forward and trying to yield results involved varying informal tactics and strategies on behalf of the researcher. Often these were targeted at building trust, creating 'buy in' from key stakeholders and broadening perspectives through novel insight from the customer. Communicating value through both the hard assets of the firm (product project) and the soft assets of the firm (business strategy) presented some challenges to how 'progress' is perceived and measured. As a manufacturing firm, progress and moving ahead is often implicitly tied to product output and feature-based innovation. Hence the two key outcomes, which were relevant to the firm, were also significant because they were strategy based rather than product based.

The first outcome was the decision to suspend a product release through the recognition that the firm needed to better understand the market it was serving and the value proposition it was offering. The second implication for the firm was recognition (particularly by the CEO of the firm) of the need to 'have someone at the table who is the constant voice of the customer'. It was decided that for the firm to embark on the journey of becoming design led and customer facing, they would need some strategically positioned people to actively source information and co-create value propositions with the customer. Consequently, the researcher became permanently contracted by the firm to fill this role and to ensure that the activities and decisions made inside the firm were indeed aligned with the customer.

10.3.2 Research design implications

As a unique research design wherein each party (university and organisation) held mutually beneficial goals, it is critical to examine the implications of the relationship between researcher and the case firm. Furthermore, how this plays a role in the outcomes of the research.

In an embedded action research study, the researcher becomes more than just a researcher because the relationship is not passive but active and reliant on each party's behaviour. In this case, the author was not only the researcher but also a design catalyst and in a resource-based sense, an employee. Furthermore, because an objective of the research is to effect change or in the least improve the firm's orientation to effect change, the individual character of the researcher becomes important to the conversation.

Disrupting existing processes or work cultures is challenging and relies on a marrying between the organisational culture of the firm and the personality of the researcher. For example, in the case firm, it was noted that often 'the person who makes the most noise gets things done'. Paradoxically, this suggests that in order to get change to occur, the researcher needs to be

cleverly aligned with the tacit cultural characteristics of the firm. In other words, if the researcher were more outspoken in challenging procedures and demanding time from key stakeholders, it is possible that the degree of change could be positively influenced. Or for a family owned firm, perhaps the design catalyst needs to be seen as someone with greater tenure in the firm who is able to get traction through established trust and familiarity. Although, the literature does suggest that the most influential people in a family owned firm are also likely to be emotionally bound to the existing business model and therefore less likely to engage in change-orientated initiatives.

Regardless of this however, the results still suggest that the researcher was able to generate some traction through an embedded approach. Undoubtedly, the ability to understand the business culture, processes and people from an internal position was imperative in gaining trust and shaping strategies to generate buy-in. Design led innovation, at its core relies on the marrying between design as an operational strength and design as a strategic strength; executed differently in every single firm according to specific business cultures, processes and structures. Hence, the idea that one could influence a design led culture from an external position of the company seems somewhat unlikely. This challenges the preference of many firms to outsource strategic design work and more specifically employ external consultancies to execute an innovation audit or change initiative. This research points to the absolute need, particularly for family owned firms to build innovation capability through an internally based engagement model. By doing so, the objectives and goals are common and are able to be sustained through the nurturing of knowledge, skill and culture.

10.3.3 Theoretical implications

On reflection of the core theoretical foundations used within this thesis, namely design led innovation and family owned business, there are some

key implications to take away from the research. Despite design thinking being a fundamentally organic approach to unpacking and solving problems, design led innovation needs to be introduced with more definitive strategies to guide the implementation process. Of course, this is difficult as every firm will be unique in terms of culture, processes, leadership and brand. However, what is known about family owned firms is that disillusionment can occur in new initiatives from a lack of strategic guides for implementation. Design led innovation cannot fall into the same stigma as some other innovation models whereby the shift is so radically foreign to businesses acumen that it is rejected. The family owned business, revised DLI model (discussed in chapter 9) attempts to make such a change more manageable by identifying some core issues and subsequently, ideas that can help secure a design led future.

For family owned business, the research suggests that there are organisational-related challenges in innovation such as organisational learning, traditional cultures and leadership, which have previously been documented in literature. But the research also indicates that these may not the only factors that affect a family owned firm's ability to change and innovate. Indirect factors that perhaps affect the innovation 'climate' of change should also be further examined, such as communication within the family leadership teams and board members; the firm's current growth situation (is the firm negatively or positively geared financially?); the design catalyst's character and hierarchical position and lastly, the firm's understanding of what innovation constitutes from the firm's perspective.

Ultimately, the research has shown that while change towards design led innovation may be a slow process for family owned firms, it is not impossible. Careful consideration needs to be applied to the method of engagement on behalf of the researcher in terms of nominating key stakeholders, developing strategies that will excite or engage and the degree of change that is actually sought after on behalf of the firm. An action research approach towards

design led innovation, certainly enabled the researcher to help stakeholders think differently about how they created and understood value both on a product centric level and a business model level. Furthermore, engaging multiple people from across the firm helped to align the operational and strategic operations of the company.

10.4 Reflections on engagement

With such an immense amount of information captured throughout the engagement (both formally captured data and observation based data) it is valuable to holistically reflect on the key turning points of the research. Understanding these points could help other family owned firm's frame their strategies in initiating design led innovation.

At the beginning of the engagement much of the time was spent being immersed in the firm, becoming familiar with the processes, culture, people and product. It was important at this point to map the firm's current business model, activities, product portfolio and customer value chain. This was critical to understanding how the firm perceived their core activities as delivering value to the customer. The initial strategy to create buy in and gain some traction was focussed on showing the gaps and opportunities available to the firm on an elevated business strategy level. Targeted insights were presented to management surrounding the need for products to be designed with a stronger brief, the need for new product development to be about designing for the customer and not for the manufacturing capability and lastly the importance of maintaining base line value through efficient lead times. The response to this type of approach was that it was simply too ambitious. It was made clear that those weaknesses were recognised and understood but were too complex to begin addressing.

At the middle of the engagement, the researcher took a scaled approach by showing the value of a design led approach on a smaller project level. Initially this proved quite successful - greater traction with key stakeholders was

gained through the common language of project discourse. Working on a product centric level gave a sense of progress for both the researcher and firm. Mapping the customer's peripheral activities and relationships was also a good design activity to show the importance of seeing the whole story outside common touch-points like installation and point of purchase.

The outcome of these activities was a customer engagement tool wherein the channels of communication between customer and firm was moved to a mobile platform to speed up lead times and make it easier for reps to deliver the right information. While this was another example of an incremental innovation, providing a tangible solution (to an immediate problem) using design thinking was important in gaining another level of trust and justifying the researcher's presence.

It became clear however that working from the operational/product level of the firm made it very challenging to transfer the insights gained back into a business model level. So although a level of buy-in was seen through the creation of something tangible, the vantage point from an operational level of the business could only provide isolated instances to communicate with key people. Consequently, the 'bigger picture' of design value to the firm became lost.

Towards the end of the engagement however, the real turning point occurred in the form of an external workshop run by university representatives on design integration in SME's. An interdisciplinary group from the firm made up from marketing, design, business development and management were asked to attend where they were challenged to rapidly prototype a number of products or services envisioning the problem from the customer's perspective. This strategy of taking employees physically away from the organisation and away from the daily responsibilities had a positive outcome.

For the first time this allowed a common language to develop explicitly about the value of design led innovation in business. The presence of the CEO also added to the group's excitement about the possibility for design led change. This workshop was certainly a key turning point of the engagement and improved the organisational 'climate' for innovation simply through the common language and unified understanding. Of course maintaining the momentum gained when back in the work environment was challenging and required varying strategies to be trialled on how to extend the conversation and create buy-in with the broader company.

10.5 Contribution to knowledge

The following table outlines gaps in the literature surrounding design led innovation in family owned firms as well as the corresponding contributions this research has made towards filling the gaps.

Literature Gap	Research Contribution
More information is required to formulate a strategy targeted at successfully helping family owned businesses to utilise design as a central capability towards innovation.	This research was able to propose some strategies specific to new product development in a family owned business using design thinking as a central capability. The main strategy proposed focussed on aligning new product development with the broader company vision.
There is no research examining the specific framework of design led innovation and its application within a family owned manufacturing SME.	This research has provided the foundations for more research into the impact and integration of design led innovation into family owned SME's. The findings of this thesis will contribute to the development of a formalised integration framework to aid the established theoretical framework.
There is currently limited empirical information linking the effects of design thinking upon organisational factors including leadership, culture and knowledge dissemination.	This research has demonstrated that through an embedded action research approach and the engagement of people using a design thinking approach – people can demonstrate altered behaviour towards decision-making and problem solving activities in their day-to-day roles. This would in turn suggest that over time,

	this would affect the culture and modes of knowledge distribution.

The hypothesis developed to break down the main research aim and provide better focus and direction to the study area was as follows:

The ability for a family owned SME to sustain and implement design led innovation ultimately depends on the embedded core culture being able to internalise and adapt to the shift in thinking

Research question:
How can organisational barriers be overcome through an action research approach to increase a family owned SME's ability to implement change and sustain a design led approach?

Research sub-question:

Could family firms where decision makers are often long-term proponents of the dominant culture benefit from nurturing innovation from a bottom up approach rather than from top down approach?

Addressing the first research question, culture is defined as a 'interpretative framework' through which individuals make sense of their own behaviour' (Scott and Lane, 2000). Applying this definition retrospectively and in regards to the research question, the findings would suggest that cultural barriers *can* be overcome within a family owned SME albeit on an individual level, in isolated instances. Participants exposed and engaged directly in the research were able to demonstrate a shift in thinking by critically assessing how their behaviour and decision making processes aligned with the broader company vision. Daily activities were impacted by design led innovation in that participants were motivated to ask 'why?' and 'of what value?' This in turn, altered behaviour to a small degree. Therefore, the researcher was able to affect the attitudes of individuals through a design led approach, which in

turn increased the organisation's ability (as a whole) to implement change. Beyond the direct participants however, it was found that engagement was minimal and without conviction. Successful strategies used to promote engagement (particularly with direct participants) in design led innovation included:

- Working on small, attainable projects that demonstrate capability, instil trust and invite collaboration from employees. Tackling smaller projects was found to gain more traction and 'buy-in' (particularly in the early stages of embedded research) than taking a strategic business wide orientation with ambitious recommendations for large-scale change.
- Delivering design led innovation workshops in an external, neutral environment where employees can be free from the day-to-day expectations that naturally take precedent in the workplace.
- Demonstrate key techniques, tools and strategies that can be used with the customer to generate insights that are new to the firm. This further establishes the design catalyst's legitimacy and capability.
- Finding ways to 'measure' the performance of design led initiatives is also a key strategy that helped participants to essentially manifest 'soft assets' into 'hard assets'.

Sustaining commitment in the long term however, requires the complete embodiment of design led innovation at the heart of the firm culture. In family owned firms where long histories have created rich and embedded cultures, it cannot be expected that full transition to design led innovation can occur quickly.

Shifting focus to the sub-question, the results challenged the hypothesis that nurturing innovation from a bottom up approach rather than a top down approach could gain greater engagement through less cultural bureaucracy. Despite the research showing that employees who were lower in

organisational hierarchy (and often with less tenure in the firm) had strong predisposed acceptance of innovation and change, the centralisation of power from the top is too dominant to shift influence. Consequently, the integration of a design led approach hinges on the commitment (through a shift in thinking) not just of individuals, but also of key upper management stakeholders.

More specifically, it fundamentally relies on the active participation of the family leadership members. If these people aren't engaged and visibly endorsing design led innovation, other employees may have a desire to act but also may not have the agency to do so. It is only through the intimate involvement of these key people that the barriers cited throughout this thesis can begin to be addressed and these people empowered to instil a design led culture. Strangely, this presents a paradoxical challenge for the design catalyst in simultaneously gaining trust (generally through *following* the archetypal procedures and culture) and instigating change (generally through *challenging* the archetypal procedures and culture).

Finally, sustaining a design led approach implies that change has been initiated and the foundations of design led innovation have been communicated, understood and valued. From this perspective, we believe that while cultural barriers can be overcome across the firm in isolated instances, any execution or implementation plan of design led innovation fundamentally relies on a cohesive and united commitment to change driven by the family.

10.6 Recommendations for future research

Firstly, this study provides the foundation for future research into design led integration within SME's and opens future paths of investigation. The focus of this study was to investigate a specific family owned firm's capability to engage with a design led approach through the model of an embedded

action researcher. The themes and experiences identified from this study should be carried forward into other case investigations of family owned firms to both validate and form a more structured set of strategic guidelines which would assist firm's in feeling confident to execute such a radical transformation.

The other framework that could be incorporated into further research is the proposed strategy surrounding the case firm's new product development processes. This should investigate the impact of having a dedicated 'champion design group' to both critically assess the alignment of new projects with the broader company vision and to centralise design thinking to nurture innovative project ideas.

While this research dealt with common organisational barriers such as learning and knowledge dissemination, leadership and organisational culture throughout the engagement, it was not intended to focus on one specifically. Secondary research targeting specific organisational characteristics like these in conjunction with a design led approach could provide a more explicit, strategic set of implementation guidelines. Although it must be noted that the findings of this thesis do indicate that commonly cited organisational barriers for family owned business are not isolated but more likely to be mutually fuelling one another. Consequently, this suggests that focusing on one barrier alone may not be able to achieve full integration of design led innovation because it will not permeate all aspects of the culture.

Lastly, future research with family owned firms examining design led innovation could find it beneficial to design the research in closer proximity with the family leader/leaders. As this research showed, without the complete backing and constant endorsement of executive management it is very difficult to achieve traction throughout the operational levels of the firm.

10.7 Conclusion

This thesis has examined the influence of design led innovation on a family owned manufacturing SME. Delivered through the investigation method of action research, the study aimed to broaden understanding of how family owned firms could integrate a design led approach to, in turn, instil a culture of innovation. More specifically, it examined the internal barriers and conflicts that firms, consultants and design catalysts may face when trying to shift an organisation's established processes and culture. This is extremely important because family owned SME's sustain a large proportion of Australia's business landscape and will need to find new ways to remain competitive if they are going to survive in the current economic climate.

Literature surrounding family owned SME's indicated unique qualities that could limit their ability to effectively pursue change and innovation. These included emotional attachment with the historical foundations of the company, which is entrenched by concurrent generations of family stewards and long-term employees. In addition, a preference to be financially frugal, lessen risk and maintain company stability for future generations. Equally so however, family owned SME's tend to harness a great deal of wisdom and accumulated knowledge from loyal employees. They are also cited as being much more likely to withstand turbulent economic and global environments through being strategically astute. In light of these traditionally business orientated challenges, one of the key gaps in knowledge is how to effectively articulate the advantages of pursuing a design approach in a way that is meaningful to business discourse. This is critical in ensuring firms are able to internalise and subsequently steer the wheel of innovation autonomously.

Utilising an action research approach over the period of one year, the researcher was embedded in the case firm. Data was captured through three key methods, a reflective journal, 25 qualitative interviews and a focus group session. Thematic analysis of the data revealed 5 key opportunities for

change that could enable the firm to be more design led. The first theme identified the individualist approach to work particularly in the process of product management and strategic concept development. Hand in hand with this was the need to involve and leverage more people from all parts of the company (including the operational/lower ranking employees) to enrich the strategic discussions and encourage challenging of ideas. Thirdly, building customer relationships to more freely capture valuable insight was seen as a key area for improvement but was also noted as dependent on the firm's ability to steer the conversation away from product. In turn, this would particularly aid the new product development process in placing more emphasis on the problem identification phases and value creation processes. The designer's ability to create innovative solutions to customer problems was also cited as being clouded by an unclear company vision to guide day-to-day critical design decisions and objectives. Lastly, the final recurrent theme was the opposing forces between employee's recognition of the need to act on change but also their lack of time to do so because of their existing responsibilities.

Some frameworks were also put forward particularly in the area of new product development as recommended initial strategies to try and align the company vision with the core project portfolio. This thesis is important to industry because it provides comparative, practice-driven findings that could be transferrable to other firms. For designers who may be involved in driving innovation and change, this thesis offers empirical evidence of strategies that elicit positive and negative responses from a family owned business.

For a firm to become successfully design integrated they must be willing to identify, eliminate or innovate aspects of the business that are not adding value to the customer. Fundamental to achieving this however is the deep understanding of what it *actually* is the customer wants. Consequently, continuation of existing business activities often prevails through a preference to protect what has been established even when there is

recognition of weaknesses in the business model proposition or execution of the proposition. This demonstrates the fundamental need for designers and firms alike to intimately understand the cultural, political, social and operational complexities that affect firm's ability to become more outward facing. Not only to capture customer information, but to internalise that information *meaningfully* into new products, services and business models that have unique value propositions.

Alignment between design and business relies on the absolute understanding of what drives value for one another and the processes that create that value. In this study, these paradigms were largely reflected through the division between operational and strategic departments of the firm. It is fundamental that these two entities are not seen as isolated activities, which tends to occur over time through the embedding and reinforcement of routine processes and culture. Successfully integrating design led innovation relies on opening up communication between these two ends of a business to ensure that a firm's soft assets like it's strategic vision is married with the firm's hard assets like it's products and services that are released into the market. Ultimately leading to numerous innovative benefits "not just in new products or services, but through employing, skilfully managing and soundly implementing design throughout a company's business strategy" (Matthews and Bucolo, 2011).

10.8 Final words

This research makes a significant contribution to the emerging field of design led innovation within family owned SME's. This research has identified key organisational barriers that impede the process of design integration within a family owned firm and the subsequent opportunities the firm could undertake. Furthermore, this research makes a significant contribution to the manner in which designers, consultants and employees could navigate such a transformation in the future. The research is particularly important for family owned SME's (and the broader SME sector) who need to find new ways to

create value beyond the product alone in order to remain competitive. The research is valuable because it provides practice-based findings to help other firm's critically assess and steer their organisations to be more innovative.

It is hoped that this research marks the beginning of a much larger research agenda into how design led innovation can be effectively integrated into family owned SME's and all types of business. Highlighting not just the challenges but also, the positive indications that family owned firms can indeed become design integrated over time. Equally so, it is hoped that more opportunities are made available for researchers to take on an embedded position within Australian organisations. To build mutually beneficial learning environments that ultimately empower and enable firms to grow competitively through design led innovation.

11.0 References

Amabile, M. T. (1996). Creativity and Innovation in Organizations. *Harvard Business School*, 396-239.

Argyris, C. (2005). Action science and organisational learning. *Journal of Managerial Psychology*, *10*(6), 20-26.

Battistella, C., G. Biotto, et al. (2012). "From design driven innovation to meaning strategy." Management Decision 50(4): 718-743.

Barringer, B. B., & Gresock, A. R. (2008). Formalizing the front-end of the entrepreneurial process using the stage-gate model as a guide: An opportunity to improve entrepreneurship education and practice. *Journal of Small Business and Enterprise Development*, *15*(2), 289-303. doi:10.1108/14626000810871682

Beckman, S. L., & Barry, M. (2009). Design and Innovation through Storytelling. *International Journal of Innovation Science*, *1*(4).

Berends, H., Reymen, I., Stultiëns, R. G. L., & Peutz, M. (2011). External designers in product design processes of small manufacturing firms. *Design Studies*, *32*(1), 86-108. doi:10.1016/j.destud.2010.06.001

Better by Design. (2012). *Better by Design.* Viewed 10, April, 2013 http://www.betterbydesign.org.nz/

Brown, T., & Wyatt, J. (2010). Design Thinking for Social Innovation. *Stanford Social Innovation Review*.

Brydon-Miller, M., D. Greenwood, et al. (2003). "Why action research?" Action Research 1(9).

Bolton, S. (2009). The Value of Design-led Innovation in Chinese SMEs. *Proceedings of the 19th CIRP Design Conference - Competitive Design* (pp. 30-31). Bedfordshire.

Borja de Mozota, B. (2004) Designers as Entrepreneurs or Intrapreneurs: Insights from Design. Oslo: Cumulus European Network Meeting.

Buckley, M., Beames, M., Bucolo, S., & Wrigley, C. (2012). Designing Radical Business Model Innovation: A Case Study. *Participatory Innovation Conference* (pp. 12-14).

Bucolo, S. (2012). *Design Led Innovation What's All the Fuss?* Brisbane: Queensland University of Technology.

Bucolo, S. and J. Matthews (2011). A Conceptual model to link deep customer insights to both growth opportunities and organistional strategy in SME's as part of a design led transformation journey. Design Management Toward a New Era of Innovation. Hong Kong, QUT eprints: 11.

Bucolo, S. and J. Matthews (2010). "Using A Design Led Disruptive Innovation Approach to Develop New Services: Practicing Innovation in Times of Discontinuity." Health (San Francisco): 176-187.

Bucolo, ; Wrigley, C. (2012). *Business Transformation through Design Integration*. Brisbane: Australian Institute of Commercialisation.

Bucolo, S., & Wrigley, C. (2012). Using a design led approach to emotional business modelling. *Leading Innovation through Design: Proceedings of the DMI 2012 International Research Conference* (pp. 323-333). Boston: Design Management Institute.

Brun, E., Saetre, A. S., & Gjelsvik, M. (2009). Classification of ambiguity in new product development projects. *European Journal of Innovation Management*, *12*(1), 62-85. doi:10.1108/14601060910928175

Chandler, A. D. (1962). Strategy and structure: chapters in the history of the industrial enterprise. Cambridge, M.I.T Press..
Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & Leadership*, *35*(6), 12-17. doi:10.1108/10878570710833714
Chetty, S. (1996). The Case Study Method for Research in Small-and Medium-Sized Firms. *International Small Business Journal*, *15*(1), 73-85. doi:10.1177/0266242696151005
Chrisman, J. J., Chua, J. H., Pearson, A. W., & Barnett, T. (2012). Family Involvement, Family Influence, and Family-Centered Non-Economic Goals in Small Firms. *Entrepreneurship Theory and Practice*, *36*(2), 267-293. doi:10.1111/j.1540-6520.2010.00407.x
Christensen. (1997). *The innovators dilemma*. New York: HarperCollins Publish ers Inc.
Christensen, & Rosenbloom. (1995). Explaining the attacker's advantage: technological paradigms, organisational dynamics, and the value network. *Research Policy, 24*, 233---257.
Cohen, W. M. and D. A. Levinthal (1990). "Aborptive Capacity: A New Perspective on Learning and Innovation." Administrative Science Quarterly 35(1): 128-152.
Cooper, R.G. (2006), "Formula for success in new product development", Working Paper No. 23, The Product Development Institute, Ancaster,
Corso, M., & Pellegrini, L. (2007). Continuous and Discontinuous Innovation: Overcoming the Innovator Dilemma. *Creativity and Innovation Management*, *16*(4), 333-347. doi:10.1111/j.1467-8691.2007.00459.x
Costello, P. J. M. (2011). Effective Action Research: Developing Reflective Thinking and Practice, Continuum.
Cowan-sahadath, K. (2010). Business transformation : Leadership , integration and innovation – A case study. *International Journal of Project Management*, *28*, 395-404. doi:10.1016/j.ijproman.2009.12.005
Crotty, M. (1998) The Foundations of Social Research: Meaning and Perspective in the Research Process. Sage Publications.
Daneels, E. (2004). Disruptive technology reconsidered: A critique and research agenda. Journal of Product Innovation Management, 21, 246 258.
Denison, D., Lief, C., & Ward, J. L. (2004). Culture in Family-Owned Enterprises: Recognizing and Leveraging Unique Strengths. *Family Business Review*, *17*(1), 61-70. doi:10.1111/j.1741-6248.2004.00004.x
Dick, B. (2002). Postgraduate programs using action research. *The Learning Organization*, *9*(4), 159-170. doi:10.1108/09696470210428886
Doblin. (2011). Ten Types of Innovation. Retrieved 10 December, 2012 from http://www.doblin.com/thinking/.
Dorst, K. (2011). The core of "design thinking" and its application. *Design Studies*, *32*(6), 521-532. doi:10.1016/j.destud.2011.07.006
Draghici, M., & Petcu, J. (2011). Knowledge Transfer - The Key to Drive Innovation for Service Organisations Excellence. *Journal of Knowledge Management, Economics and Information Technology*, (4), 1-10.
Dym, C. L., Agogino, A. M., Frey, D. D., Leifer, L. J., & Eris, O. (2005). Engineering Design Thinking , Teaching , and Learning. *Journal of Engineering Education*, *94*(1), 103.
Elden, M., & Chisholm, R. F. (1993). Emerging Varieties of Action Research: Introduction to the Special Issue. *Human Relations*, *46*(2), 121. doi:10.1177/001872679304600201

Ezzy, D. (2002). *Qualitative Analysis: Practice and Innovation* (pp. 138-159). Crows Nest: Allen & Unwin.
Family Business Australia; KPMG. (2011). *Stewards : Moving forward , moving onward*. *Business*.
Fraser, H. M. A. (2007). "The practice of breakthrough strategies by design." Journal of Business Strategy 28(4): 66-74.
Green, R. (2006). *Competing Through Innovation: An international perspective*. *Framework* (pp. 1-13). Australia.
Hall, A., L. Melin, et al. (2001). "Entrepreneurship as Radical Change in the Family Business: Exploring the Role of Cultural Patterns." Family Business Review 14(3): 193-208.
Harris, D., Martinez, J. I., & Ward, J. L. (1994). Is Strategy Different for the Family-Owned Business? *Family Business Review*, *7*(2), 159-174. doi:10.1111/j.1741-6248.1994.00159.x
Homburg, C. and B. Rudolph (2001). "Customer satisfaction in industrial markets: dimensional and multiple role issues." Journal of Business Research 52: 15-33.
Hovanessian, N. (2008). Design Co-Entrepreneurship ; Deploying the Interface between Design and Entrepreneurship for Nurturing Innovation in SMEs. *International DMI Education Conference Design Thinking: New challenges for Designers, Managers and Organisations*. France.
Institute for Family Business. (2011). *Family Business Stewardship*. *Business*.
Javed, N. (2013). The Supremacy of Innovation. *Innovation Management.se.* Retrieved February 11, 2013, from http://www.innovationmanagement.se/2013/02/11/the-supremacy-of-innovation/?utm_source=twitterfeed&utm_medium=linkedin
Johnson. W,. M. (2010). Seizing the white space: Business model innovation for growth and renewal. Harvard Business Press, Boston.
Laforet, S. and J. Tann (2006). "Innovative characteristics of small manufacturing firms." Journal of Small Business and Enterprise Development 13(3): 363-380.
Lawson, B., & Samson, D. (2001). Developing Innovation Capability in Organisations: a Dynamic Capabilities Approach. *International Journal of Innovation Management*, *05*(03), 377-400. doi:10.1142/S1363919601000427
Lockwood, T. (2010). Design Thinking: Integrating Innovation, Customer Experience and Brand Value. New York, Design Management Institute.
Manufacturing Australia (2012). For want of a nail. Business Review Weekly, Business Review Weekly 20.
Marion, T. J., & Meyer, M. H. (2011). Applying Industrial Design and Cost Engineering to New Product Development in Early-Stage Firms. *Journal of Product Innovation Management*, (28), 773 - 786. doi:10.1111/j.1540-5885.2011.00839.x
Martin, R. (2009). The Design of Business, Harvard Business Press, Boston.
Matthews, J. and S. Bucolo (2011). Continuous Innovation in SMEs: how design innovation shapes business performance through doing more with less. Proceedings of the 12th International CINet Conference: Continuous Innovation: Doing more with Less. Denmark, Aarhus University.
McCann, J. E., Leon-guerrero, A. Y., & Haley, J. D. (2001). Strategic Goals and Practices of Innovation Family Businesses. *Journal of Small Business Management*, *39*(1), 50-59.
McGrath, H., & O'Toole, T. (2012). Critical issues in research design in action research in an SME development context. *European Journal of Training and Development*, *36*(5), 508-526. doi:10.1108/03090591211232075

Miller, D., Isabelle H., Lester, R. (2009). Stewardship or Agency? A Social Embeddedness Reconciliation of Conduct and Performance in Public Family Business, 1-41.
Mills, J., Platts, K., & Gregory, M. (1995). A framework for the design of manufacturing strategy processes: A contingency approach. *International Journal of Operations & Production Management*, *15*(4), 17-49.
Mintzberg, H., & Waters, J. a. (1990). Tracking Strategy in an Entrepreneurial Firm. *Family Business Review*, *3*(3), 285-315. doi:10.1111/j.1741-6248.1990.00285.x
Möller, K. (2006). Role of competences in creating customer value: A value-creation logic approach. *Industrial Marketing Management*, *35*(8), 913-924. doi:10.1016/j.indmarman.2006.04.005
Moore, G. A. (1991). *Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers*. Harper Collins Publishers.
Neumeier, M. (2008). The Designful Company: How to build a culture of non-stop innovation. California, New Riders.
Norman, D. (2009). The way I see it: When security gets in the way. interactions 16, 6 (November 2009), 60-63. DOI=10.1145/1620693.1620708 http://doi.acm.org/10.1145/1620693.1620708
O'Regan, N., Ghobadian, A., & Sims, M. (2006). Fast tracking innovation in manufacturing SMEs. *Technovation*, *26*(2), 251-261. doi:10.1016/j.technovation.2005.01.003
O'Reilly, C. a., & Tushman, M. L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organisational Behavior*, *28*, 185-206. doi:10.1016/j.riob.2008.06.002
Oxtoby, B., T. McGuiness, et al. (2002). "Developing Organisational Change Capability." European Management Journal 20(3): 310-320.
Peças, P., & Henriques, E. (2006). Best practices of collaboration between university and industrial SMEs. *Benchmarking: An International Journal*, *13*(1/2), 54-67. doi:10.1108/14635770610644574
Prime Minister's TaskForce on Manufacturing. (2012). *Smarter Manufacturing for a Smarter Australia* (pp. 1-94).
QMI Solutions. Design Integration. Retrieved 12 February 2013 from http://qmisolutions.com.au/products_services/design-integration/
Rajkovic, T. (2011). *Innovation Strategies in New Product Development: Balancing Technological, Marketing and Complementary Competencies of a Firm* (pp. 32-39). Internationaler Verlag der Wissenschaften.
Rammer, C., Czarnitzki, D., & Spielkamp, A. (2009). Innovation success of non-R&D-performers: substituting technology by management in SMEs. *Small Business Economics*, *33*(1), 35-58. doi:10.1007/s11187-009-9185-7
Rampino, L. (2011). The Innovation Pyramid : A Categorization of the Innovation Phenomenon in the Product-design Field. *International Journal of Design*, *5*(1), 3-17.
Rasmus, D. W. (2010). *Management by Design: Applying Design Principles to the Work Experience*. Wiley.
Rese, A., Baier, D., & Woll, R. (2005). Stages , Gates , and Conflicts in New Product Development : A Classification Approach *. *Design*.
Rogers, E. M. (1962). *Diffusion of innovations*. Free Press of Glencoe. Retrieved from http://books.google.com.au/books?id=zw0-AAAAIAAJ
Roos, G. (2012). *Manufacturing into the future: Summary of the Recommendations*. Adelaide.

Roy, A. and R. K. Gupta (2007). "Knowledge Processes in Small Manufacturing: Re-examining Nonaka and Takeuchis' Model in the Indian Context." Journal of Entrepreneurship 16(1): 77-93.
Sainio, L.M., & Puumalainen, K. (2007). Evaluating technology disruptiveness in a strategic corporate context: A case study. Technological Forecasting and Social Change, 74(8), 1315-- ‐ 1333. doi: DOI: 10.1016/j.techfore.2006.12.004
Schoenenberger, E. (1997). The cultural crisis of the firm. Oxford: Blackwell Publishers.
Schon, D. A. (1983). The reflective practitioner: How professionals think in action.London: Temple Smith.
Scott, Susanne; Lane, V. R. (2000). A Stakeholder Approach to Organisational Identity. *The Academy of Management Review*, *25*(1), 43-62.
Sharma, P., Chrisman, J. J., & Chua, J. H. (1997). Strategic Management of the Family Business: Past Research and Future Challenges. *Family Business Review*, *10*(1), 1-35. doi:10.1111/j.1741-6248.1997.00001.x
Smith, M. (2008). "Differences between family and non-family SMEs: A comparative study of Australia and Belgium." Journal of Management and Organisation 14: 40-58.
Starbuck, W. H. (1983). Organisations as Action Generators. *American Sociological Review*, *48*(1), 91-102.
Teece, D. (2010). Business Models, Business Strategy and Innovation. Long Range Planning 43 (2-3). 172194.
UK Design Council, 2008, *Designing Demand Review.* Viewed 10 April 2006, http://www.designcouncil.org.uk/documents/documents/publications/designing_demand_review_design_council.pdf
Verganti, R. and D. A. Norman (2012). Incremental and Radical Innovation: Design Research versus Technology and Meaning Change. Designing Pleasurable Products and Interface. Milan, Design Issues.
Verganti, R. (2008). "Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda *." Journal of Product Innovation Management 25: 436-456.
Verganti, R. (2009). Design Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean. Boston. Harvard Business Press.
Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations and Production Management*, *22*(2), 195-219. doi:10.1108/01443570210414329
Ward, A., Runcie, E., & Morris, L. (2009). Embedding innovation: design thinking for small enterprises. *Journal of Business Strategy*, *30*(2/3), 78-84. doi:10.1108/02756660910942490
Westhead, P., & Howorth, C. (2006). Ownership and Management Issues Associated With Family Firm Performance and Company Objectives. *Family Business Review*, *19*(4), 301-316. doi:10.1111/j.1741-6248.2006.00077.x
Wheelwright, S., & Clark, K. (1992). Revolutionizing Product Development Quantum Leaps in Speed, Efficiency and Quality. The Free Press, New York.
Wiesner, R., Banham, H. C., & Poole, N. (2004). Organisational Change in Small and M edium Enterprises (SMEs). *21st CCSBE-CCPME Conference: Entrepreneurship and Economic Development: Innovation, Opportunity and Capacity.* (pp. 12-13).
Wrigley, C., & Bucolo, S. (2012). New organisational leadership capabilities : transitional engineer the new designer? *Leading Innovation through Design: Proceedings of the DMI 2012 International Research Conference* (pp. 913-922).
Wrigley, C. J, (2011) *Visceral Hedonic Rhetoric Design.* Queensland University of Technology.

Yin, R. K., (1989). *Case Study Research: Design and Methods. Volume 5 of Applied Social Research Methods*. SAGE Publications.
Zahra, S. A., J. C. Hayton, et al. (2008). "Culture of Family Commitment and Strategic Flexibility: The Moderating Effect of Stewardship." Entrepreneurship Theory and Practice 1.

12.0 Appendix

Appendix A: Example transcript samples and coding

Method	Sample transcript/reflection
Semi-structured, in-depth qualitative interview	**Interviewer:** Yeah what I see is that Company X have this great culture of communication, people can interrupt any time but then in terms of that communication in terms of processes and putting an order through the system I'm not sure if people from different departments are aware of what each other actually do - what the challenges are. Would you agree?
⇐ Skill, Empowerment, Learning	**Participant E:** Yes, *people here get pigeonholed with what they're good at.* In sales, while it might not be written on a piece of paper, it'll all be the same. They should all be doing the same job. Some people will be doing the specials folders, some will do Partner Company X, some will do projects. They've all got their own little niches that they do well at and understand and then that becomes the norm. But it all breaks down when someone is away or something untoward happens and then it all falls apart, maybe most could pick up the other person's but it's in a different style and *they miss little things that aren't clearly communicated.* They've been communicated previously but because it's not written down in a process or something it's missed again. I can see, that's why I am glad they are spending the time and seeing the amount of work that the Systems Manager is putting into it because if that can work it will solve so many problems it's not funny. Particularly down stairs, because again, dealing with supply ... guess ...not to put tickets on myself but I have a good ability to either look at a drawing and a BOM and know what's what. Generally understanding the product. But other people don't. Like bomers sit there doing BOM's everyday but the number of times I'd have to hand stuff back because of the errors through lack of either asking the question of the designer to re-iterate or double-check, *it's just making an assumption on their own.* So I think half the time, it's more the fact they don't talk when there is something wrong. It's that attention to detail and I think, sure not everybody has the greatest attention to detail *but the communication could be vastly better.*
⇐ Communication, Collaboration	
⇐ Communication	
	One thing that I do know about the company is that they're very big on empowering people to decisions on their own which is great, it's a great way to do business, except you get certain people who don't necessarily back themselves enough or when they do, they haven't necessarily considered all the facts so it's a bit - it can bite you a bit. Then you go back to them an say hey, what's this?' and they say dunno, I just did it that way'. You can't just say because ... give us some reasons to think about.
	Interviewer: Right and when you say about empowering staff, why do you think there are so many meetings?
⇐ Skill, Empowerment, Learning	**Participant E:** Absolutely. *But this is when It comes down to the upper management might believe they are trying to empower people, but people don't feel empowered and they feel they need get the collective ok* and that's where I try and live by what they say...Company X have got a lot of older more, long-service a bit harder to get out of that. And everyone gets in the habit of…we'll do this meeting, we'll do this meeting.
	Interviewer: What do you think people's perspective is on this program that I'm engaged with here?
⇐ Pro-activity, new product development	**Participant** E: Well I think where you're coming from is exactly what we spoke about at the stage here *being proactive on the designs - that's what you're here to do essentially asking for a company to do, which requires change.* Which at the moment, in my view, is 100% not that way. Here, there is very minimal people that share that point of view, *you'll have to change an entire*

⇐ Change, culture, leadership

company's point of view of this company itself - so everybody has got to change the way they think of Company X to be able to act in the new way. I think from that point of view you've definitely got your work cut out for you. You definitely need the support of most people here. You're essentially asking for a complete transformation of the company and now saying that we can be design led and we can set up a design team, that's only 5%. The big part of it is that everyone has to start thinking that way and be on board with it.

Interviewer: The hardest thing I think is getting people to understand that, 'well you may not deal directly with the customer, you may not talk directly but the way that you approach the job and the whole work culture is reliant on everyone, So that's really interesting I didn't really think of it in the way that you have to change what the company stands for before people will change.

⇐ Change, leadership, brand vision

Participant E: You've got the new branding in your favour. *It's a point in the sand and we can say 'hey, this is the way we want to be seen. This is the changes we want to do.* This is what do, let's move in this direction and it'll be Company X before branding and Company X after). But of course you've got 500 odd employees around the company thinking that way all at once. That is how a business needs to think to go forward in leaps and bounds like they want. *You can only be reactive for so long.* You have to be a market leader in what you come up with.

⇐ Change, culture, brand vision

Interviewer: So in regards to specifically Product X. I see a lot of a hesitation and negativity around it when I talk to people- why do you think this is?

Participant E: I used to hate that with a vengeance, the way people responded to Product X because once I did data I looked after Product X production. That is company wide, expect for maybe Person X. When you're in the meetings with Person X, he puts his passion and everything across and you start to see what he's getting at and then you look at the product and compare it to others, it's not a bad product at all. It's a pretty good product. The added features to what competitors have, I think there has been a lot of internal issues with getting it up and running. In my opinion, the people who've been given control of the different parts are not the right people. *You've got a designer who frankly doesn't give two hoots about It because it has been going for so long, it has gone backwards.* Different design notions are put forward and then tend to become ad hoc and people say 'no, no, this way'. So engineering wise it hasn't had the focus to get that new product off the ground because we don't have an R&D team. Production wise they just see it as another dead product because it has been going for so long. They don't see the benefit of doing it and the people who it's been given to out there are by no means team leaders or anything -wanting to get a product done. It doesn't help in getting new products out that you need to get feedback from everybody. You need to get feedback from the shop floor - how did it go together, what needs to be tweaked but you don't get that. Then you're just guessing and then you're doing a big run of 20 or 30 and then its whinge, whinge, whinge.

⇐ Empowerment, skill, culture

⇐ New product development, culture, process

So everybody gets frustrated because then you've got stock that just goes out the window. That's what I was trying to do - I was trying my hardest. Taking a lot of the ownership and trying to dry-up all the different parts. In a round about way - I took over doing floor layouts and everything for Product x line. It's not my job but I put my hand up to do it. *Then you've got a supervisor out there who is very negative towards the product* It's very hard to maintain focus and drive. In, the design team are maybe not negative but I think because it's been one person's thing the whole way through, it's kind of… *You're trying to get a new product out there, they're trying to come up with new ideas but you're sticking with the same people or one person. Realistically, if its been going for so long why wouldn't you get new people to look at it. With fresh ideas and things.*

⇐ Change, culture

⇐ Creativity, collaboration, culture

Interviewer: New product-development, so I was talking to another participant

about blue- skying" - how do designers go about getting dedicated collaborative time to think about the products and generate new ideas, is that a priority and how do you make it a priority?

Participant E: Nil priority right now that's for sure. *I know a number of the designers aren't you know ... they're drafters at best*. There's a handful that have that industrial design background. If there is anything that I wanted to be thought outside the square - I will go to those 10 people, just because they've got that mindset you know. It's kind of sad that we bring in these people and sort of put them in the same thing, *and if you want to keep those people here and keep them entertained this is exactly what you need to do and it's the perfect opportunity to try and get on " ...you know think outside, here's the market, here's the direction', What do you think might happen.* Capitalise on those skills they have I mean the only bit of ID that I've seen really in my time here has been like the lock-sock for the cabinets and even that was going be *contracted out to a design consultancy.* And that was something new that no one else has done. It doesn't get played up at all either. That's the thing, it stays really quiet. Maybe if it was made more of a thing maybe people would take more notice of it. No one ever said 'oh it's a great idea, lets have a look at some of the issues' it was *always' oh that's wrong - that isn't going to work- that's too hard to go on and off. A lot of negativity but again that comes down to change. That's gonna be the brick wall behind everything.*

⇐ Empowerment, skill

⇐ Empowerment, skill, innovation, creativity

⇐ Strategy, culture, creativity

Limitations that we've got with Product X right now. Number one: *we don't have a design firmed up so we haven't even thought about marketing this thing,* A couple of people might have but from what I can tell, *there's not really been anything to say hey this is the marketing push, this is what we are trying to achieve.* Then you get questions about the product technical aspects from reps and you could get the feeling from them that there is just no confidence there and when there is no confidence there, you're hard pressed to get the product out there. Until we can get the confidence in ourselves.

⇐ New product development, customer, process

⇐ Culture, vision leadership, strategy

Focus group

Participant 2:
Well we actually had a team, I used to be the R&D manager, then we disbanded R&D. R&D became defunct and therefore…

Participant 1:
Why do you think it disbanded?

Participant 4:
We pushed it into the product management responsibility, that was the thought I would...is that what you'd suggest at the time, I don't know? (to Participant 2).

Participant 2: I don't want to get into heavy debate about that but umm…I know that even before I came along there was another guy before me and he used to be in marketing and he then-the company made a decision to have a dedicated R&D thing is what we call an innovation space…doesn't matter what name you call it but umm and so they had this dedicated R&D team basically, just an R&D for new projects and things like that and then after I was here a few years, they disbanded it. Maybe it was because of me, I don't know but anyway. Whatever it might be ahh… I'm not getting all funny about it but it was disbanded so the core of people working on R&D projects sort of evaporated…or it dissolved into other areas – it became product managers and things like that.

Participant 7:
So lets say hypothetically a designer went with the product managers out to see customers and they were there using their skills as designers to guide the conversation…would that close any gaps or not give value back to B&R?

Participant 7:
Two ways…if that was the case, the design team potentially, would have to, not so much put on a sales hat, but understand sales a bit more in what you can and can't say, do, offer that kind of thing *but be active in the conversation in the fact that you're coming from a design background helping the to understand what the customer truly wants*, not what they've seen from a catalogue or what they've got from a competitor but understanding hearing form the customer, making that model up in your head or even out there on a laptop. Just qualifying what the customer is saying, instead of always having to deal…I mean I know we have to have sales people there as a point of contact but –

⇐ Collaboration, Pro-activity

Participant 3:
Our sales people do nothing but take orders.

Participant 7:
And that's the problem, there is potentially not that, there is a middle person that changes the chinese whispers and you know *our design team probably don't feel that they can ring up a customer and go through stuff, they have to ring up the sales rep to…and that's where as I said, the role needs to change*.

⇐ Empowerment, Skill, Innovation

Participant 4:
Yeah and being provided that level of responsibility, that you are allowed and enabled to…

Participant 3:
It'd be interesting question to ask though, is to find out if they actually wanted that level of responsibility. Most of them are probably pretty happy to walk up and go 'what box do you want, yep, we got 4 of them, 6 in stock….cya next week'. Boom gone, you know, like its completely different relationship they have with their customers.

Participant 7:
Exactly, prototyped – you had…. it's the process of prototyping, that to me is not really a failure. *But you probably got more out of that prototyping with having designers there*. I mean I know it's a non-measurable thing.

⇐ New product development, empowerment, leveraging skill

Participant 2:
Well you know it wasn't so much what customers said, it's what they didn't say. You watch them do something, you think wow, didn't realise you did that.

Participant 3:
We can look at this two ways, it's like, the way were structuring, hypothetically how this might look, talking a lot about going out there, capturing a lot of information about product. But there is a whole other side of it that I think is even more valuable than product. *You come back to the fundamentals of what feature you make, someone else can copy it and make that, but it's your business model, your systems, your relationship, that whole side, I think that's probably where the real value is.*

⇐ Culture, vision leadership, strategy

Participant 3:
You can get a designer to take them out there and look at your product's features compared to the opportunity and all that sort of thing but potentially I think what that course is trying to do it about using that exploratory design thinking that designers have as tools and being able to take that tool and apply it to. Yeah you can go and talk to the customer, but it's about looking at what else is going on around them, that is actually allowing that product to be there

in the first place. Concepting things which aren't products where their delivery methods….

⇐ Strategy, culture

You've got to know all the business models that are out there and that kind of stuff and then you have to take all of that, meld it in a big pot, stir it around and come out with another recipe that actually gives you a blue sky type situation or unique offer. Unfortunately *I would say as a business we are fault tolerant,*

⇐ New product development, strategy

so I mean we get a kick up the backside, you don't get a big kick up the backside. So, *it is a bit fault tolerant, which is good in a way because if you are experimenting, it helps that kind of thing.*

Participant 4:
That's interesting, you say then we have a culture of fault tolerance

⇐ Strategy, market insight, vision

Participant 2:
Oh I've been involved with *at least two or three projects where we've killed it at literally the 11th hour.* I can remember we did 'Project x', remember 'Project x'? we built a prototype, we were ready to go to market. We built it, painted it, we got two or three customers come in and I remember one customer in particular who had a look and said 'geez it's built like a tank isn't it.' And that's it, it was dead, one statement, everybody walked out of there and it was dead. And it was 11th hour, we were ready to ….

Well I think that's a very positive thing, I know it sounds negative but it's very positive in the sense that as a company we are prepared to just kill a project when we realise 'shit we've made a mistake, that's not right. I think that's very positive, rather than just hammering along and just finding that you're spending even more money,

Participant 7:
What we need to try and do is capture that earlier. Because that's exactly why you take on an awful lot of risk and its just lucky that they're prepared to say right…cross off the books. Start again.

⇐ Individualist, culture,

Participant 2:
Those projects they were driven by personalities more than anything. He (employee) was driving that process – but ahh so you have a personality, just like you're a personality,

⇐ Individualist, time, responsibility, focus, vision, goals

you're a personality so you drive your own little bandwagon and I'm sitting in my office and I'm thinking right I;ve got to focus on Company X division and I've got to get this project but just trying to get that done and I'm sort of thinking, well tough luck Participant 7. Because carrying all this stuff with me, I'm just not going to get all of it done and out the end of the tunnel. But it's personality driven and its, if you don't have a deep understanding of the market, it's difficult to then internalise the product and say well, a business proposition and say well there is a business proposition if we change the model slightly over here. Very difficult.

⇐ Process, vision, focus, value creation,

Participant 2:
One of the fundamental problems is that you've just got too many pies in the fire therefore you cant really focus.

Participant 3:

⇐ Opportunity, process, vision, leadership

The structure around here, *if someone said to me pick up this project and do this, I'd just be like 'I don't need this project' because although they're the key for growth in the future, making the most noise is the day to day and that's where my focus is.*

⇐ Process, organisational structure, leadership

Participant 3:
I think you've got to get the structure right before you address any of this to be honest. You can't try and ram this down a path where it's not going to fit. You need a structure that is going to be able to adapt it or adopt it.

Participant 5:

Well you need people receptive to that structure and (name) isn't receptive to that structure so that's possibly why he's not here. I can say even if we do get this off the ground and rolling there is going to be people downstairs who aren't receptive to the structure. *You need to work out how to integrate everyone into that structure* so that's you can change who does what as much as you like but if everyone is not on board, the focus is exactly the same and it doesn't mean shit. So you know like there is guys downstairs who would not do IP testing.

⇐ Collaboration, vision, communication

Participant 4:
Yeah so we know we'll hit barriers to overcome -we need to be different in the way we work our way through those barriers.

Participant 5:
And the difference might not necessarily be in structure.

Participant 2:
I think to answer your question Participant 7, is one of the ways to go forward would be to internally have a lot more conferences….try to use that word more carefully. Or seminars or…I mean the other word for it is training…but when you say that it has such a bad feeling and everyone goes….but I mean we talk about sort of sharing and that kind of stuff and to me, I've got bucketloads of information up in my brain and you've got bucketloads of information up in your brain and you know if you put it into a put and we could all use all of that stuff I think we'd be in a much better space and that's training. It's the sharing and it's training. *Yeah so its sharing of information so everyone becomes more informed,* so like if you're doing a survey and you can say 'what do you do, what do you say, what do you look out for?' We go on these seminars and all that externally and we go 'ohh, we've got to do something' and all that kind of stuff, but we have it already in here it's just everyone is so busy with their work it's pushed away but it's there.

⇐ Communication, collaboration, learning, knowledge, dialogue

Participant 7:
You know what and I've used it since doing this course is the why questions, you come up against people who might not share….and you drill down with them asking them the why and eventually you can find something that you can refute or say well this is why. Then all of a sudden it does change that thought process for them.

Participant 5:
Actually pausing to think critically…
So instead of having that central focus, it then became everybody's problem… like usage and all that kind of stuff to try and pull together a team of guys to try and control and run that thing, which…*was like hurting cats you know, just hopeless...nobody really wanted to be there and I just thought well why, you know, you do your own bloody thing and I know what I'm doing and…you know what you're doing.* Then (researcher) came along and is like come on…let's get together…so I've sort of been up and down this curve a few times…

⇐ Individualist, culture, time, collaboration, environment

Participant 7:
You've sort of been here before, that's essentially what you're saying –that's what I'm hearing.

Participant 2:
That's right, yeah..and this design for Six Sigma stuff you know, I was supposed to implement that, that came about because (GM) and (CEO) went to (partner company) and (partner company) said 'Ohh this is what we're really doing…and CEO thought it was a fantastic idea – brought it back and said Participant 4 you'll go ahead with this…so I did…but you know at the end of day it only became me because it….nobody else sort of, you guys….

Participant 7:

So why do you think that failed?

Reflective Journal

1 | Access to customers
As the reps are the key to access to customers for interviews – it is integral that they are on board with the project. Furthermore, their involvement would capitalize on the customer engagement and provide an opportunity to visit the customer again. When approaching one rep about setting up a particular interview – I their experiences with Company X rather their day-to-day experiences in their profession dealing with suppliers. Stringent briefing to management required before being able to go to the customer.

2 | Organisation of workshop – people to contribute
Confusion as to the purpose of the workshop – conversation with other marketing employees reveals a real concern of the success of the workshop and why certain people will just not be interested in contributing or see any value in the workshop. Time out of the day to be getting on with normal jobs. How will people now how to answer these questions? – These are not the sorts of questions we would normally be asked. This framework for a workshop is something so different from what is normally done. Good luck with engaging people. Advice to exclude some departments from the workshop as they do not have anything to do with new product development or branding or innovation.

10 | When does design stop and the old ways creep back in?
Presentation of new approach, which involves looking at industry segments as well as product applications and market potential. Validation of those concepts with customer basis is also important factor and one that I will not let slide perhaps as quickly as some would like. If we are continuously altering the way things may have originally been done from a design perspective – we have to be careful we do not go down the same path NPD has in the past. Furthermore, what value am I bringing being a designer? Communicator of thought and discussion?

15| Defining Applications workshop
Workshop was held to produce cohesive definitions of each market application. Was low-medium level of engagement. Sense of too much detail – it is just an (product omitted). Towards end of workshop – discussion lead away from task at hand to 'why is this being done?' We know where it should go – just do it kind of sentiment. Segmenting the market too much - too complex and over-complicating the situation. Fairly good discussion of definitions. Value in pointing out that they were there for their knowledge – higher level of engagement.

16 | Working from a bottom up approach with a product
It's very difficult to align greater strategic goals of the design led approach in a business sense when you are bound by the process of an already defined product. More-so the product is laden with pre-defined attitudes, perceptions , channels and limitations. As the product has already moved through the research and design phase it is very difficult to draw linking associations with organisational limitations and the product. Consequently the two bodies of information or focus become separate where the goal is simply to get the product to a working place but to also question how it was done in the first place. To address both is very difficult. The bottom up approach is certainly valid however in this instance because the product is in a tangible phase – it is hard to show how the design approach could have occurred and even if there are novel findings with the customer research-the challenge to influence those insights onto the product are made even more difficult. A product in conceptual stages has more capacity to be influenced and for the resources of the business to be more involved in the growth and design of the product.

20 | Design Integration Workshop
One of the greatest difficulties as admitted by the firm itself is to move beyond simply recognising the faults to doing something about them. The problem

being that addressing the problems would mean taking resources, time and risk from the core business activities thus potentially compromising the perceived strengths of the company. So unless a new activity, meeting , agenda or goal can be fully documented as adding value to the current business it is highly unlikely to be engaged. This was evident with the suggestion to have people from HR, design and marketing along for a crash course in design skills workshop. The decision to not remove those people was motivated out of there was no clear objective or perceived added value to the current activities.

Appendix B: Example analysis of codes and relationships

Direct Quote	Group Interjected Quote	Reflection on Behaviour
Qualitative Interviews	Focus Group	Reflective Journal
Focus Group		

		Direct quotes / group interjected quotes			Reflection on behaviour
Category/ Phenomenon	Code	Qualitative interviews	Focus Group	Total	Reflective Journal
Context	Research	3	2	5	
	Environment	25	6	31	
	Age	3	0	3	
	Role	8	4	12	
	Brand	9	0	9	
	Australia	4	1	5	
	Family	33	8	**41**	
	Manufacturing	12	1	13	
	Design	17	14	31	
	History/Time	45	5	**50**	
	Engineering	3	0	3	
Strategy	Leadership	52	9	**61**	
	Customer insights	22	6	28	
	Novelty	17	0	17	
	Buy-in	23	14	**37**	
	Problem solving	16	3	19	
	Design thinking	0	8	8	
Process	Collaboration	36	2	**38**	
	New product development	49	19	**68**	
	Customer research	20	18	**38**	
	Communication	49	5	**54**	
	Routine	8	3	11	
	Change	28	5	33	
	Design	10	17	27	
	Skill	29	20	**49**	
	Research and development	3	6	9	
	Idea generation	12	12	24	
Consequences	Leveraging of skill	32	7	**39**	
	Empowerment	29	0	29	
	Learning	6	1	7	
	Unfamiliarity	4	3	7	
	Ambiguity	0	11	11	
	Knowledge acquisition	16	3	19	
	Creativity	6	2	8	
	Culture	47	10	**57**	
	Vision	38	0	**38**	
	Innovation	10	3	13	

Theme Colour	Description
Family, History/Time, Leadership, Buy-in, Culture, Vision	Any notion that refers to the firm's need for stronger company vision and communication of growth strategy. Furthermore, any notion that refers to the importance of family leadership in driving change.
New product development, Collaboration, Customer research	Any notion that refers to the firm's strategy surrounding conversations and dialogue with the customer. How this information is captured and used in collaborative forums to further identify the problem.
Skill, Leveraging of skill	Any notion that refers to the opportunity for employees including those lower in hierarchy to contribute more knowledge and experience in order to enhance the firm's ability to innovate and activate change.
Communication	Any notion that refers to the individual pursuit of projects and activities. Also the personality driven impacts that negatively or positively gear the firm for innovation.